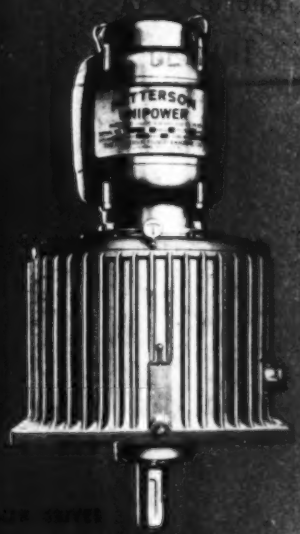
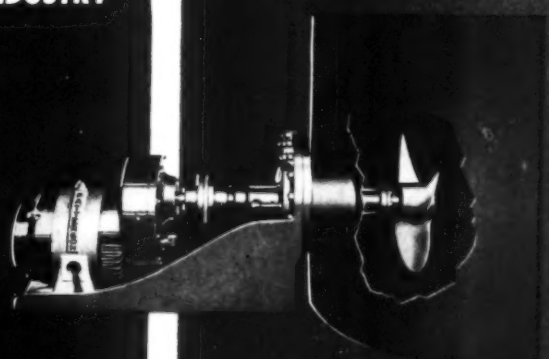
THE PAPER INDUSTRY
and PAPER WORLD
AN EDUCATIONAL NEWS MAGAZINE—APRIL, 1943

HELPING YOU
MAKE THE
Best
OF YOUR
TOUGH
PRODUCTION JOBS!



PATTERSON dependable **EQUIPMENT**

for the PAPER INDUSTRY

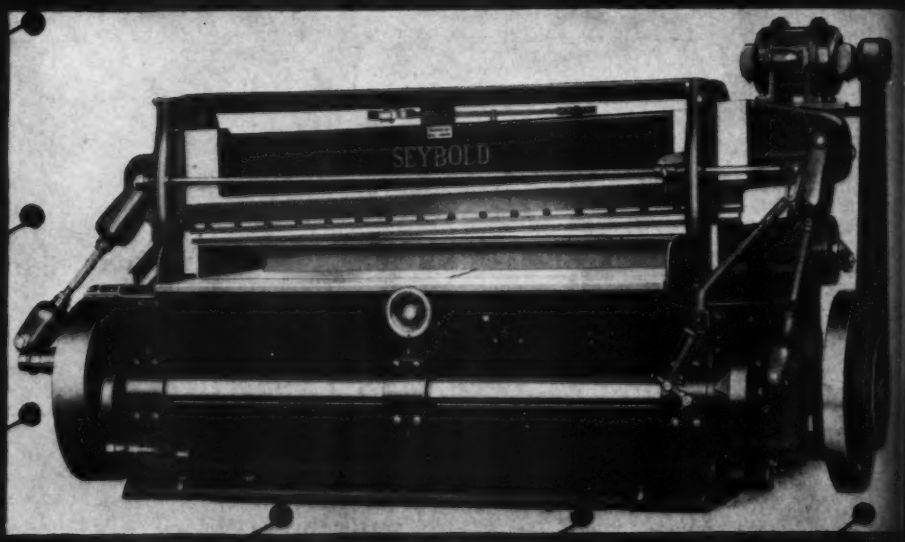


THE PATTERSON FOUNDRY & MACHINE CO.

Richard L. Cameron
President

EAST LIVERPOOL, OHIO, U. S. A.

WAR PROTECTION TAGS



KEEP IT CLEAN

KEEP IT OILED

INSPECT CUTTING KNIFE

INSPECT CLAMP PRESSURE MECHANISM

INSPECT DRIVING CLUTCH AND BRAKE

CHECK TABLE

War made Seybold Paper Cutting Machines priceless in the sense that they are irreplaceable with new machines under existing restrictions.

Protection of your Seybold Cutters should be MUST legislation in your plant. The 6 "PROTECTION TAGS" indicated above might well be tied on every Seybold Cutter operating in your plant as a daily reminder to whomever is responsible for their proper maintenance.

If you want more details about the application of those 6 points of protection, advise your nearest Seybold distributor.

HARRIS • SEYBOLD • POTTER COMPANY
819 WASHINGTON STREET • DAYTON, OHIO

SEYBOLD DIVISION

SEYBOLD SALES AND SERVICE

New York
E. P. LAWSON CO., INC.
426 West 33rd Street

Chicago
CHAS. N. STEVENS CO., INC.
112 West Harrison Street

Southern Sales District: HARRIS-SEYBOLD-POTTER CO., 220 Luckie St., N. W., Atlanta, Ga.

West Coast Distributor: HARRY W. BRINTNALL CO., San Francisco, Los Angeles, Seattle

Canadian Distributor: HARRIS-SEYBOLD-POTTER (CANADA) LTD., Toronto and Montreal

BACK WHEN WE MADE PAPER MACHINERY
Since Pearl Harbor, the Beloit shop picture has changed in a way that has surprised us—and would surprise many a paper maker, too! The switch from paper machines to implements for Uncle Sam was made with a minimum of delay by the entire Beloit organization. Handling husky parts with watchmaker precision is second-nature for men like John Carter, shown here drilling a suction-roll head. Ever since 1858 Beloit has developed the skill and facilities necessary for doing *big* jobs, *precision* jobs . . . and today *the most important job of all!*
Buy War Bonds for Victory!
BELOIT IRON WORKS · PAPER MACHINERY · BELOIT, WIS., U.S.A.
SERVING UNCLE SAM FOR THE DURATION
1ST
WHEN YOU BUY BELOIT . . .
YOU BUY MORE THAN A MACHINE!
BELOIT
BELOIT IRON WORKS, BELOIT, WIS.

IN PEACE AND IN *War!*

The craftsmanship, the precision standards, and the manufacturing facilities of the Bagley and Sewall Company have been recognized and are now engaged in the war effort.

Schedules have been stepped up, and today we are working around the clock in the production of many kinds of war equipment.

The result of such recognition renews in the minds of paper mill folk the precision of Bagley and Sewall equipment, the constant engineering service, and the guarantee that its product is scientifically correct.

THE BAGLEY AND SEWALL COMPANY

WATERTOWN, NEW YORK

MORE EFFECTIVE USE OF PROCESS STEAM

WITH the need for ever greater output, the efficient use of exhaust steam becomes an important contribution to the Nation's war-effort.

You can provide an efficient source of heat for kettles, ovens, digesters, coils, retorts, mixers, dryers, etc., by using exhaust steam free from cylinder oil, when engines are lubricated with the proper grade of *Texaco Steam Cylinder Oil.*

Texaco Steam Cylinder Oils atomize completely, adhere to cylinder walls, assure low oil consumption, and separate rapidly from the exhaust.

So effective have Texaco Lubricants proved that they are definitely preferred in many important fields, a few of which are listed in panel.

A Texaco Lubrication Engineer will gladly cooperate in selecting the most efficient steam cylinder oil for your equipment . . . just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write to:

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated and fueled with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

TEXACO

TEXACO Steam Cylinder Oils

FOR EVERY STEAM CONDITION

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

The Flags are going up all over America!

In this fateful hour, 130,000,000 Americans have pledged that we *shall not* fail. That is why every Army-Navy "E" that rises over the war plants of the nation causes American hearts to beat stronger with hope, with courage — and with renewed determination to fulfill their sacred pledge. For these flags are both a symbol of our strength . . . and a warning to our enemies that the day of their final destruction is drawing closer.

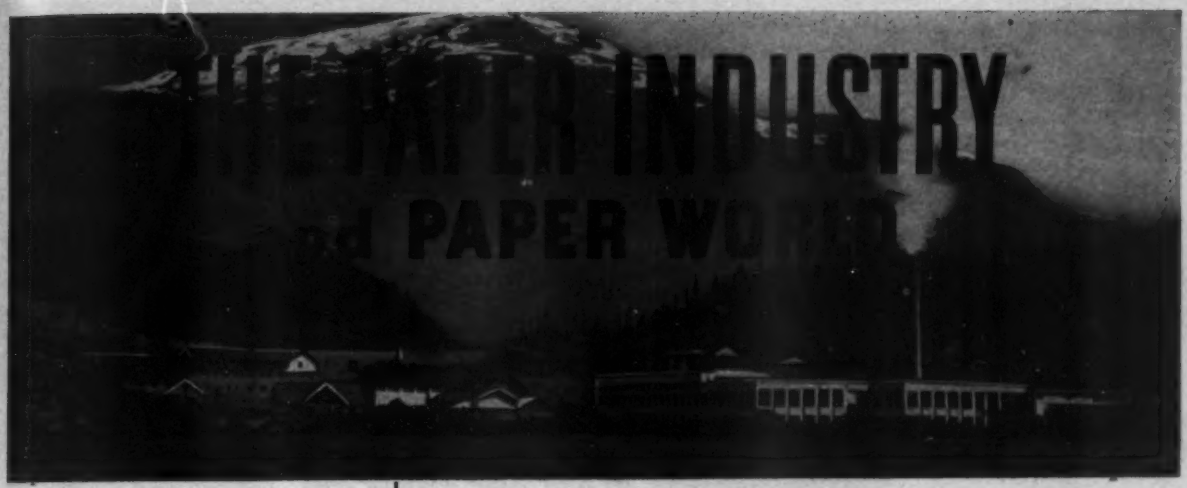
Today, the Army-Navy "E" flies over the Niagara Falls plant of the Mathieson Alkali Works. From this plant a continuous stream of chemicals flows into the nation's war industries . . . chlorine, caustic soda, ammonia, sodium methylate, sodium chlorite and high test calcium hypochlorite.

To the friends and industries who look to Mathieson for many of their essential chemical requirements, we express our appreciation for their cooperation and forbearance which has helped us maintain a record production of war materials. Teamwork like this will help raise other "E" flags over America's war plants — and will help keep them flying at full mast until victory is ours.

Mathieson **CHEMICALS**

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42ND STREET, NEW YORK, N. Y.

LIQUID CHLORINE . . . SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . BLEACHING POWDER . . . HTH PRODUCTS . . . AMMONIA, ANHYDROUS and AQUA . . . FUSED ALKALI PRODUCTS . . . SYNTHETIC SALT CAKE . . . DRY ICE . . . CARBONIC GAS . . . SODIUM CHLORITE PRODUCTS



Published monthly by
FRITZ PUBLICATIONS, INC.
59 E. Van Buren St., Chicago, Ill.

EDWARD B. FRITZ
Founder

A. SCOTT DOWD
President & Gen. Mgr.

A. C. L. FRITZ
Vice Pres. & Treas.

A. C. BRUCE
Secretary

HARRY E. WESTON
Editorial Director

BESSE MERRITHEW
Editor

EDGAR C. FARREN
Production Manager

G. E. VON ROSEN
Circulation Director

C. J. ELWELL
Circulation Field Representative

THE PAPER INDUSTRY and PAPER WORLD is indexed regularly in *The Industrial Arts Index*. An index to each volume is issued annually by the publisher. The index to Volume 24 is Section Two of this issue.

Copyright 1943 by Fritz Publications, Inc.

Member:
Audit Bureau of Circulations
Associated Business Papers, Inc.

VOLUME 25 — APRIL, 1943 — NUMBER 1

—FEATURES—

Women Chemists in the Paper Industry ..... *Lois Hans* 33
Forests Are Helping America Fight ..... *Joseph L. Muller* 35
Wood in Pulp and Paper Mill Construction ..... *F. W. Gottschalk* 36
Maintenance of Battery-Powered Industrial Trucks ..... *F. L. Sahlmann* 41
Brazed Ends Make Wire Rope Safer to Handle ..... *F. L. Spangler* 43
Glycerine Keeps Pace with Paper Progress ..... *Georgia Lettingwell and Milton A. Lesser* 44
Convention Papers . . . Abridged 64

—NEWS—

Scrap Metal Collection 10
Trade Winds 11
Allied 48
Associations 52
Safety 54
Names in the News 56
Personals 58
Necrology 62

—DEPARTMENTS—

Theme Page 10
Editorials 27
Current Thought 28
Paper Sketches 46
Coming Events 52
Safety Contest Scores 54
New Equipment and Supplies 92
Technical Developments 96
Papermaking Patents 98
New Publications 100
Current Market Quotations 102
Index to Advertisers 105

ADVERTISING REPRESENTATIVES

New York
LOUIS D. SCHNABEL
9 Rockefeller Plaza
Circle 7-3085
New York, N. Y.

Cleveland
KURT R. GROENER
15910 Fernway Road
Skyline 2647
Shaker Hts., Cleveland, O.

Chicago
JOHN D. HENDERSON
59 E. Van Buren Street
Wabash 3543
Chicago, Illinois

Los Angeles
Nourse Associates, Park Central Building, 412 West 6th Street, Los Angeles, California

Entered as second class matter June 29, 1938, at the post office at Chicago, Ill., under the Act of March 3, 1879. Subscriptions in the United States, U. S. Possessions, Canada, Cuba and Mexico, $3.00 for one year, $5.00 for two years. All other countries $5.00 for one year, $8.00 for two years.

for continued high

ACHIEVEMENT

The Ohio Injector Company — first in the valve industry to receive the coveted Army-Navy "E" award for high achievement in the production of war equipment now has been awarded the first Star for "continued high achievement."

To our Distributors, their OIC Customers and our suppliers we again say:

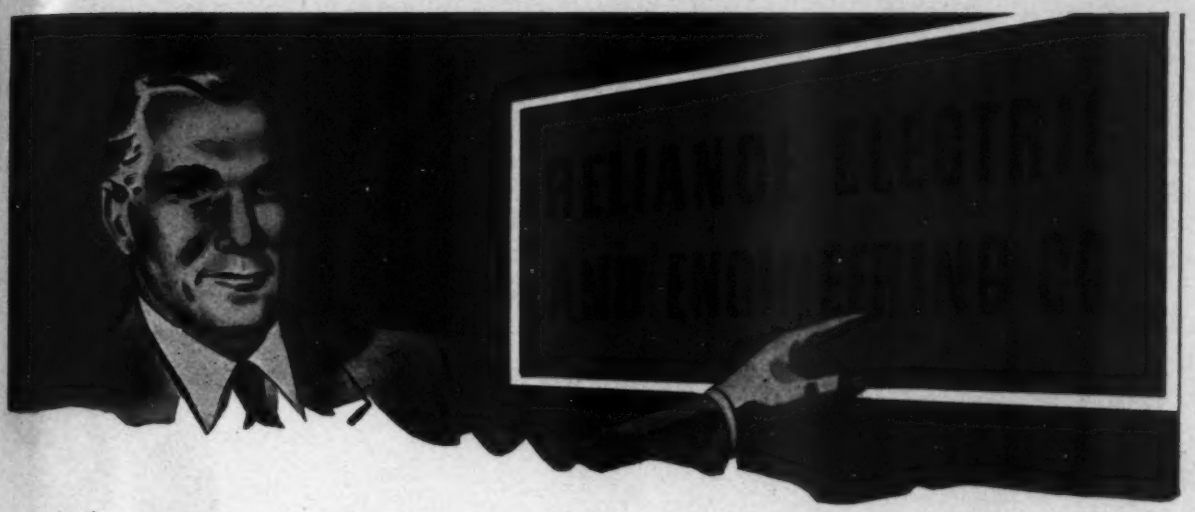
"You rightfully share with us in this honor. Thank you sincerely for your splendid cooperation."

OIC

THE OHIO INJECTOR COMPANY

WADSWORTH, OHIO

Quality Leaders in Valve Manufacture Since 1883



... I do mean "And Engineering"!

It is not enough, we think, to build top quality motors; rugged and smooth-running motors; motors of advanced design with unique protective features and low-maintenance advantages. This we do.

But, our job is not done until we have pooled our motor-building ability and engineering experience with your intimate knowledge of the operating requirements in your plant.

FOR MOTOR-DRIVE IS MORE THAN POWER. Properly applied, motor-drive can do *many things.**

Reliance Application Engineers—production minded men with broad experience in many industries—will welcome an opportunity to help you get the right answers to the question—*"What can we make the motor do besides supply power?"*

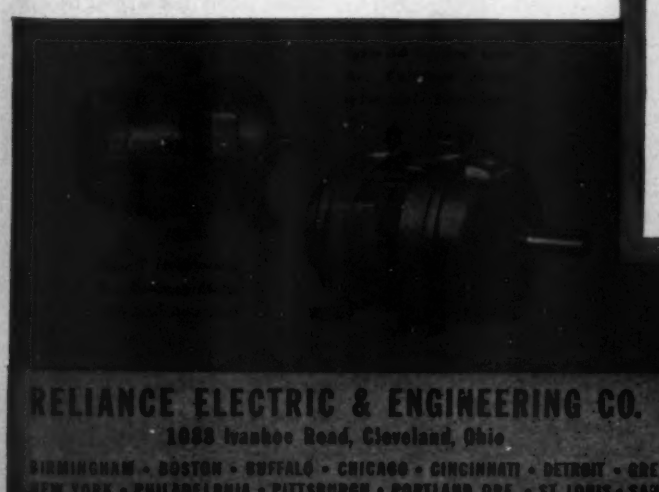
Just phone or write the Reliance office nearest you.

***Motor-drive provides within itself a means of:**

Speed Control	Reversing
Braking	Remote Control
Tandem Operation	Controlled Acceleration
Tension Control	Safety

Slow Speeds for inching, threading, inspection

Applying them to boost production and improve quality is APPLICATION ENGINEERING. That's our business.



RELIANCE A-C D-C MOTORS

RELIANCE ELECTRIC & ENGINEERING CO.
1088 Ivanhoe Road, Cleveland, Ohio

BIRMINGHAM • BOSTON • BUFFALO • CHICAGO • CINCINNATI • DETROIT • GREENVILLE, S. C. • HOUSTON, TEX. • LOS ANGELES • MINNEAPOLIS
NEW YORK • PHILADELPHIA • PITTSBURGH • PORTLAND, ORE. • ST. LOUIS • SAN FRANCISCO • SYRACUSE, N. Y. • AND OTHER PRINCIPAL CITIES

Biggest Customer of the Paper Industry!

From the day a soldier goes to war, he is dependent on paper.

From his draft card to his honorable discharge, his records are kept on it.

His rations are packed in it; his cartridges are wrapped in it; his shoes are lined with it; his letters are written on it.

His barracks are built with paper wallboard, paper roofing, paper insulation.

He shoots at paper targets, eats from paper plates, drinks from paper cups.

His battles are planned, his orders are issued, on paper.

Literally, he lives, trains, travels and fights, with paper his indispensable ally.

All this makes the United States Army the largest user of paper in the world. And in supplying the urgent need of this, its biggest customer, the paper industry is performing a vitally essential service.

KENWOOD WOOL PRODUCTS

F. C. Huyck & Sons is proud to be serving an industry so essential to the war program. Our skill, our facilities and our 72 years of experience are always available in solving the special felt problems created by urgent wartime paper needs.

F. C. HUYCK & SONS

Kenwood Mills

Albany New York

AMERICA'S WAR PRODUCTION DEPENDS ON TANKS LIKE THESE

Take a good look at these huge spherical tanks. Chances are your hose, your belts, your packings may come from them or from others just like them.

These are used for storing butadiene in the first of the synthetic plants operated by U. S. Rubber Company . . . a second will soon be in production.

Having worked in the field of synthetic rubber since 1921 we know what uses each of the five basic types of synthetic rubber is best suited for . . . Neoprene, Buna-S, Buna-N, Butyl and Thiokol . . . U. S. Rubber uses all five types . . . knows which one to select for the performance required . . . and how to compound the specific synthetic rubber for the specific task. This experience is important to you.

Our booklet on synthetic rubber will give you much valuable information. Send for your copy.

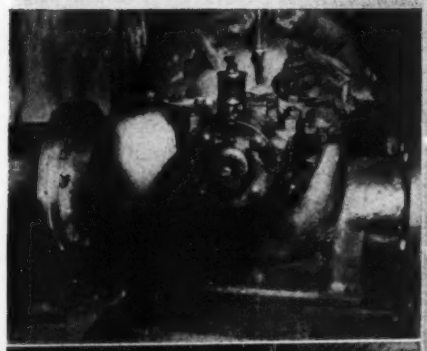
Mechanical Goods Division

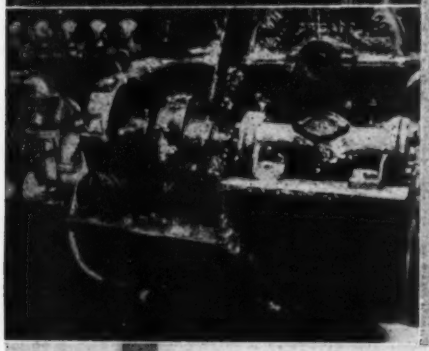
UNITED STATES RUBBER COMPANY

ROCKEFELLER CENTER • NEW YORK

First Paper Mill to win the Army-Navy "E" has efficient system of

SCRAP METAL COLLECTION





● Since last September, the Hammermill Paper Company, Erie, Pennsylvania, has made an intensive, organized effort to dispose of its dormant scrap. To date, the campaign has netted the following:

314,000 pounds of steel
267,000 pounds of cast iron
100,000 pounds of brass and bronze
36,000 pounds of lead
30,000 pounds of rubber and miscellaneous
Reclaimed for reuse; a considerable amount of structural iron pipe, valves, fittings, bolts, and parts.
All metals sold, reclaimed and used to date total well over 800,000 pounds.

● The Hammermill plant was not entirely a virgin field for such an activity, since considerable material had been disposed of during the two years preceding the scrap campaign.

● Some of this tonnage came from conventional channels—from the replacement of obsolete steam engines—but more of it came from methods not normally followed: (1) all slow moving stores items were analyzed and some of them scrapped; (2) salvaged equipment not in use was offered for sale, and after a reasonable effort, material not salable was scrapped; (3) all items held in the various departments were inventoried and their usefulness carefully studied.

● Department heads furnished a list of obsolete piping, wiring, and equipment never removed. This was turned over to the Maintenance Department for action.

● Salvage pickup stations designated by suitable signs were established throughout the mill. This facilitated collection routine.

● The company's Conservation Department is headed by a conservation co-ordinator with an engineer for an assistant. The shortage of help caused a fluctuation of salvage labor from month to month. Approximately six men were maintained in the salvage yard, but temporarily they were transferred to other duties when needed.

● When maintenance labor is required for removal, it is charged to the Conservation Department. One maintenance man spends most of his time re-threading bolts and fittings which are returned to the stores.

● In addition to dormant scrap, the company has disposed of the following process scrap during the past six months: 135,000 pounds of waste paper and 1,800,000 pounds of waste pulp.

Officials of the WPB claim that inventories of steel companies show the shortage of scrap metal is still acute. Fine promotion work is being carried on by the Business Press Industrial Scrap Committee.

DEFINITION OF DORMANT SCRAP: If it hasn't been used for three months, and if someone can't prove that it's going to be used in the next three - find a use for it - or scrap it.

TRADE WINDS

New Wood Pulp Allocations

▶▶▶ THE WAR PRODUCTION BOARD issued the following release on April 2:

The increasing shortage of certain grades of wood pulp necessitates a more general use of groundwood, newsgrade unbleached sulphite, de-inked waste fiber and other waste papers in paper and paperboard manufacturing, the WPB Pulp and Paper Division stated today in connection with the April wood pulp allocations.

The attention of the Wood Pulp Allocation Industry Advisory Committee was focused on this problem during its March meeting held in Washington.

The summary of wood pulp allocations for April follows:

Bleached Sulphite: The supply of bleached sulphite continued short relative to current consumption Allocations of market pulp were again on the basis of a 30-day inventory in the hands of non-integrated mills. As de-inking plants are currently operating at less than capacity, their operations must be raised wherever possible. If bleached sulphite consumption continues at the present level, future allocations may have to be curtailed below 30 days and other grades of pulp substituted for the deficiency.

Strong Unbleached Sulphite: Strong unbleached sulphite was allocated on the basis of a 45-day inventory. The supply situation in this grade will, of course, be affected if it is substituted for bleached sulphite to meet future shortages.

Newsgrade Unbleached Sulphite: This grade is in relatively ample supply. Its increased use is urged as a means of conserving the better grade pulps.

Bleached Sulphate: Allocations of this grade were made to provide consumers with roughly a 30-day inventory. The supply of northern grades is relatively scarcer than the southern but shortages are serious in both.

Unbleached Sulphate: Allocations were on a 30-day basis in both the northern and southern grades. The market supply of Southern Kraft continues to be restricted by shortages of pulpwood and increased requirements for container board.

Soda: It was only possible to allocate enough to maintain an estimated 30-day inventory as of April 30 in this grade. Consumption will have to be curtailed if inventories are to be maintained at this level.

Groundwood: This grade, like newsgrade sulphite, is easier than most others. Some consumers are already introducing groundwood into papers where it was formerly not used and increased groundwood consumption is necessary to relieve the shortage in other grades.

General Summary

General Preference Order M-93 (issued to control the supply and direct the distribution of wood pulp) has been in operation for one year. Inventories of most grades of pulp are down to a 30-day average basis. Unless there is either decreased consumption or increased production of bleached sulphite, bleached and unbleached sulphate, strong unbleached sulphite and soda pulp, it will be necessary to substitute groundwood and newsgrade unbleached sulphite to compensate for the shortage.

Increased use of old papers is a partial solution, but groundwood and newsgrade sulphite must necessarily be used in papers formerly manufactured only from the higher grades of wood pulp. Allocations under M-93 can be employed to accomplish this result, but any voluntary adjustments which pulp consumers make will assist materially in balancing the pulp budget.

In response to recent appeals to the industry, Forms PD-290, PD-291, and PD-292 were filed on time by the great majority of producers and consumers in March. This eased the work of the Pulp and Paper Division materially and it is hoped the good record will continue.

TRENDS

▶▶▶ DESPITE THE ANNOUNCEMENT that there will be no immediate cut in the production of newsprint, publishers and congressmen continue to agitate the question, with protests against any further reductions at some future time. One publisher in a public address has stated that there is likely to be a radical reduction after July. The Rules Committee of the House of Representatives has approved a resolution for an investigation of any government plans to curtail production of newsprint. An inquiry into a proposal to institute broad grade labeling of commercial products is included. Such a plan, it is stated, would eliminate all advertised brands of all products, and leave no one anything to advertise, which would be a blow to the newspapers.

Meanwhile a drastic program for reduction of the number of grades weights and sizes of paper has been recommended to the War Production Board. The plan calls for a reduction of about 66 per cent in the number of grades, which it is estimated would mean a saving of from 8 to 10 per cent in paper consumption by printers.

A definite trend is evident against an earlier plan of the Office of Price

Administration to base paper prices on the potential profits of paper mills. The OPA had ordered some roll-backs in paper prices because the existing prices, in its opinion, permitted undue profits. The paper industry has asserted that the law permitting the fixing of price ceilings was intended to prevent an upward spiral of prices and consequent inflation, but that consideration of the profit element should not be used to force price reductions. The industry has asserted that its prices are not unreasonably high, and that proposed production limitations automatically increase the unit cost, and that the OPA in ordering price roll-backs has refused to recognize the existence of this condition, axiomatic in the paper industry. Price increases, however, will not be permitted if they involve increases in profits.

MANAGEMENT-LABOR COUNCIL WILL WORK WITH THE WPB

Formation of a Management-Labor Council to meet periodically with the chairman and other top officials of the War Production Board, to discuss WPB plans and policies as they may affect organized industry and organized labor and in general to bring both groups more intimately and effectively into the war program, was announced on March 30 by Chairman Donald M. Nelson. The Council will have eight members, four of whom have been named by Mr. Nelson. They are:

Eric Johnston, president of the Chamber of Commerce of the United States.

Philip Murray, president of the Congress of Industrial Organizations.

Fred Crawford, president of the National Association of Manufacturers.

William Green, president of the American Federation of Labor.

Each of these men will select one additional member from his own organization to sit with him in the meetings of the Council.

▶▶▶ BECAUSE OF THE EXTENSIVE use of glassine, greaseproof and parchment papers for food wrapping, non-essential uses of such papers has been prohibited. It is expected that this order will save from 10,000 to 15,000 tons per year for food wrapping, instead of for decorative wrapping of civilian commodities.

▶▶▶ NEW CEILINGS applicable to distributors of several hundred coarse paper products have been fixed, through the medium of setting mark-ups. The OPA states that the new fixed mark-up schedule closely approximates the mark-ups found in normal times by the National Paper Trade Association. About 2,100 dealers will be affected.

▶▶▶ EFFECTIVE APRIL 1, container board manufacturers were required to set aside 25 per cent of their output of kraft and jute board for allocation by the WPB to manufacturers making boxes for military and other government shipments.

▶▶▶ THE WAR MANPOWER COMMISSION, in collaboration with the Pulp and Paper Branch of the War Production Board, will review the essentiality of the pulp and paper industry. It is apparent that the War Manpower Commission's policy of "work or fight" includes paper and pulp mill employees as already working in essential industry, until and unless some new order is issued, and employees of this industry should not seek employment elsewhere. It is also apparent that prudent management will shift to female and over-age employees as rapidly as, and to the maximum degree, possible.

▶▶▶ PRICES OF SOUTHERN PULPWOOD have been frozen, pending the fixing of price ceilings and there has been an adjustment of the existing ceilings in the Lake States, to allow the usual differentials between species and between peeled and rough wood.

▶▶▶ WAR PRODUCTION BOARD order E-9 tightens control over the production and distribution of certain precision measuring instruments and testing machines. It covers balancing machines, bench centers, comparators, gauging machines, and other types of devices (whether power-driven or hand-operated) having a retail price of $200 or more. Repair and maintenance parts are exempted, and automotive maintenance equipment and precision devices designed specifically for laboratory use are not affected.

◆

CANADA NEWSPRINT OUTPUT TO GO DOWN

According to a return tabled in the House of Commons in answer to questions by H. E. Brunelle, liberal member for Champlain County, total Canadian production of newsprint in 1942 was 3,177,094 tons, and the cut in output ordered by R. L. Weldon, newsprint administrator, is expected to reduce 1943 production by 261,598 tons.

According to Mr. Weldon, production has been cut in Ontario and Quebec to make more power available for war industries. In 1942 Quebec produced 1,711,643 tons, and a reduction of 217,897 was ordered in 1943; while Ontario's production will be reduced by 11,274 tons. Production in that province in 1942 was 916,170 tons. Production in other provinces will also be reduced.

◆

VANCOUVER PAPER BOX COMPANY TO OPERATE UNDER NEW OWNERSHIP

Interests headed by K. F. R. Mair and E. D. Judson have acquired the manufacturing plant of Vancouver Paper Box Company, Ltd., located in Vancouver, British Columbia, and will operate it as an independent producer of a regular line of folding and setup boxes. During the past year, the plant has been operated by the Victoria Box & Paper Company, a subsidiary of Sidney Roofing & Paper Company, of Victoria, which purchased it from Japanese interests through the Alien Property Custodian's office.

The organization, to be known as Vancouver Paper Box (1942) Ltd., will be managed by Mr. Mair, who has been manager of the Davies Paper Box Company, of Vancouver, for the past several years.

◆

WARTIME FOREST FIRE PREVENTION CAMPAIGN

The 1943 Wartime Forest Fire Prevention campaign has just been announced by the Federal Forest Service and the Association of State Foresters. Following a plan prepared by the Advertising Council's talent pool, of which R. Z. Eller of the California Fruit Growers Exchange is Co-ordinator, the drive this year will point out that timber is listed as a critical war material; that fighting forest and woodland fires diverts manpower—7,760,000 manhours of it—from industries and farms each year; and that smoke from forest and woodland fires interferes with the training of pilots and invites attacks by Nazi and Jap subs.

Outdoor displays and hundreds of thousands of smaller 4-color posters will spotlight the fire peril in areas adjacent to forests and farm woodlands. Other campaign material—including envelope stuffers, bookmarks, and 16 mm. movie trailers—may be secured from or through State Foresters or the Federal Forest Service about the time the forest fire seasons start in each major forest region, according to forestry officials.

Emphasizing Secretary of Agriculture Claude R. Wickard's statement that "Until we smash the Axis, forest fires are enemy fires," and calling at-

PAPER · · · America's 6th Industry

SHIPS BUILT ON PAPER

(NEWS ITEM: *Thirty thousand pounds of blue print paper were required before the first rivet could be driven in a U.S. battleship launched recently.*)

It takes thousands of pounds of paper before a ship can leave the drafting room. And once actual building begins, the necessary plans and instructions make the demand for paper supplies even greater.

But the Paper Industry's job of serving the Navy does not stop at the completion of the boat.

Aboard ship are tons of paper needed to govern the day's activities of our sailors. Specially treated paperboard is used to keep food supplies water-tight and free from handling dangers.

Puseyjones Engineers offer their whole-hearted cooperation to the Paper Industry in its all-out for Victory.

The new automatic Dryer Felt Tightener developed by Puseyjones maintains uniform pre-set tension of the dryer felt to the dryer surface without any attention on the part of the operator.

It eliminates all hanging weights, holds the paper firmly against the dryer surface and increases the dryer felt life by eliminating strains.

Puseyjones men and production facilities are on war work. In the meantime, we are doing our best to supply replacement parts to keep present equipment operating efficiently.

Write for folder, "The Post-War Fourdrinier Machine."

All orders subject to priority conditions of War Production Board.

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-Making Machinery

Wilmington, Delaware, U.S.A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

tention to the campaign's slogan "Our carelessness—Their Secret Weapon," these officials join in the following appeal—

1) Never use fire to clear plow land, burn debris or logging slash, etc., without a permit if State laws require one; without scraping or plowing around for safety; without help handy.

2) Stop to smoke in safe places during dry weather. Observe the rules in areas closed to smoking.

3) Be sure matches, cigarettes, and pipe ashes are cold before throwing them away; that campfires are dead before leaving them.

4) Kill small fires, report others immediately to the nearest ranger or State fire warden.

5) Help on the home front to win the war by preventing forest, grass, and brush fires.

◆

N. Y. STATE COLLEGE OF FORESTRY GIVES COURSE IN DRY KILN PRACTICE

The 24th annual short course in dry kiln practice held its first class meeting on March 31. The course will end April 9. Given by the New York State College of Forestry, Syracuse University, the course is more important than ever before because of the outstanding role it now plays in National Defense. Requirements for wood in the present emergency have taxed mills and factories beyond their maximum capacities, and the reduction of wastage is a vital factor. The proper drying of wood would increase the output greatly.

It is a practical course and deals generally with the inspection of wood, preparation of wood for kiln drying, kiln operating, study of drying factors, troubles in kiln drying, types of kilns, kiln building, special problems in kiln drying, and treatment of insects and fungi-damaged wood. It requires no previous training or experience, and a certificate is granted on completion of the work.

For further information address Professor Hiram L. Henderson, New York State College of Forestry, Syracuse, New York.

◆

E. B. EDDY CO. MILL CLOSED FOR DURATION

The E. B. Eddy Company's newsprint mill in Hull, Quebec, has been closed by the Canadian Government (effective April 11) probably for the duration of the War.

Officials of the company declined to say how many men would be affected by the shutdown, but said that an attempt would be made to absorb them in other branches of the plant. According to the Newsprint Administrator R. L. Weldon, requirements of the customers of the mill will be taken care of by other mills operated under his administration.

◆

SMITH PAPER, INC. LOSES STOCKS OF HEMP IN FIRE

Cigarette paper in the raw, stored by Smith Paper, Inc., of Lee, Massachusetts, in a warehouse at Troy, New York, was destroyed by fire recently.

The warehouse held huge stores of baled hemp used for the manufacture of cigarette paper, and the loss to the building and the stored materials was estimated unofficially at several hundreds of thousands of dollars. The block-long building, owned by the Simmons Machine & Tool Company, was under lease to Smith Paper, Inc.

Just a little over a week later, on March 19, this company suffered another loss estimated at $10,000 when water from automatic sprinklers damaged baled flax.

◆

SOUTHERN KRAFT HOPES TO BUILD BARGE AND WHARF AT WINYAH BAY

The Southern Kraft Division of the International Paper Company has made application to the War Department for permission to construct a pulpwood barge loading wharf and drive pile dolphins in Winyah Bay near the mouth at North Island, South Carolina.

The question of the proposed construction is under consideration, statements regarding the work having been received at the office of Col. D. W. Griffith, U. S. district engineer, prior to March 2 from those interested in the navigation of these waters.

◆

SCHROON RIVER MILL BOUGHT BY ASHLAND PAPER MFG. COMPANY

The Ashland Paper Manufacturing Company, of Ashland, New Hampshire, bid in the assets of the Schroon River Pulp and Paper Company, including the paper mill at Warrensburg, New York, for $37,500 at a bankruptcy sale conducted at the mill in Warrensburg, on March 12.

Seymour Baum, vice president of the Ashland firm, said it was the firm's intention to continue production at the Warrensburg mill and repairs already have been started. The Ashland Paper Manufacturing Company has paper mills at Ashland and Marcellus Falls, New Hampshire.

GRATON & KNIGHT

ALABAMA
Birmingham — The Young & Vann Supply Company
Mobile — McGowin-Lyons Hdwe. & Supply Company

ARIZONA
Kingman — Tarr, McComb & Ware Commercial Company
Tucson — Albert Steinfeld & Co., Inc.

ARKANSAS
Helena — Lewis Supply Co.
Pine Bluff—Arkansas Mill Supply Co., Inc.
Texarkana — Buhrman-Pharr Hdwe. Co.

CALIFORNIA
Bakersfield—Hopper Machine Works, Inc.
El Centro — Imperial Hardware Co.
Fresno and Los Angeles — Pacific Mill & Mine Supply Co.
Oakland — Bay City Iron Works
Sacramento — Sacramento Rubber Co.
San Francisco—Honolulu Iron Works Co.
Stockton — Geiger Iron Works, Inc.

CONNECTICUT
Bridgeport — Hunter & Havens, Inc.
New Haven—The Page, Steele & Flagg Co.
Plainville — Ideal Machinery Co.
Stamford — The Geo. W. Southwick Co.
Waterbury — The White Supply Co.

DISTRICT OF COLUMBIA
Washington — Nat. Equip. & Supply Co.

FLORIDA
Jacksonville—The Cameron & Barkley Co.
Miami — The Cameron & Barkley Co.
Tampa — The Cameron & Barkley Co.

GEORGIA
Atlanta — Fulton Supply Co.
Columbus — Columbus Iron Works Co.
Rome — Battey Machinery Company

ILLINOIS
Chicago and Moline — Sterling Products Company, Inc.
Decatur — The Field & Shorb Co.
Quincy — E. Best Plbg. & Htg. Supply Co.
Rockford — Mid-States Industrial Corp.

INDIANA
Indianapolis — Van Camp Hardware & Iron Co.

IOWA
Des Moines — Globe Machinery & Supply Company

KANSAS
Leavenworth — Great Western Mfg. Co.

KENTUCKY
Hopkinsville — Cayce Mill Supply Co.
Louisville and Lexington — Tafel Electric & Supply Co.
Paducah — Henry A. Potter Supply Co.

LOUISIANA
Monroe — Weaks Supply Company, Ltd.
New Orleans — Standard Supply & Hdwe. Company, Inc.

MAINE
Portland — W. L. Blake & Company

MARYLAND
Baltimore — The L. A. Benson Co., Inc.
Salisbury — The R. D. Grier & Sons Co.

MASSACHUSETTS
Fall River — Harold F. Wordell
Holyoke — J. Russell & Co., Inc.
Lowell—The Fairgrieve Belting Co., Inc.
New Bedford — Manufacturers' Supply Company, Inc.
Taunton—The Pierce Hardware Co., Inc.

MICHIGAN
Battle Creek — Kendall Hdwe. & Mill Supply Company
Bay City — Chevrier Supply Co.
Escanaba — Delta Hardware Co.
Houghton — I. E. Swift Company
Kalamazoo — Kalamazoo Mill Supply Co.
Lansing — Michigan Supply Co.
Menominee—North'n Hdwe. & Supply Co.
Port Huron—Moak Machine & Supply Co.
Sault Ste. Marie — Soo Hardware Co.

MINNESOTA
Duluth — Kelley-How-Thomson Co.

DISTRIBUTORS

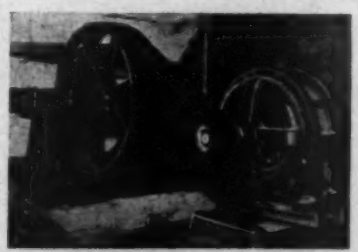
MISSOURI
Kansas City — Langdon Supply Co.
Richards & Conover Hdwe. Co.
H. R. Williams Mill Supply Company
St. Joseph—Jamieson Machine Company
NEBRASKA
Omaha — American Machinery & Supply Company
NEW HAMPSHIRE
Keene — M. S. Perkins Machine Co.
NEW JERSEY
Newark—Dodge-Newark Supply Co., Inc.
Passaic—New Jersey Eng. & Supply Co.
NEW YORK
Buffalo — Weed & Company
Elmira — Barker, Rose & Kimball, Inc.
Lockport—Ward Bros. Mill Supply Co., Inc.
Newburgh — W. L. Smith
Rochester — Haverstick & Company, Inc.
Syracuse — Onondaga Supply Co.
Troy — Fred K. Blanchard, Inc.
NORTH CAROLINA
Charlotte — The Textile Mill Supply Co.
OHIO
Akron & Massillon — The Hardware & Supply Co.
Cincinnati — The Scallan Supply Co.
Cleveland — The Geo. Worthington Co.
Columbus—The Smith Bros. Hardw'e Co.
Dayton — Dayton Industrial Supply Co.
Findlay & Toledo — Bearing & Transmission Co.
Mansfield — The Hughes Supply Co.
OKLAHOMA
Oklahoma City — Federal Supply Co.
OREGON
Klamath Falls — Lorenz Company
Portland — Harris Supply Company
PENNSYLVANIA
Allentown — William H. Taylor Co., Inc.
Pittsburgh — Somers, Fitler & Todd Co.
Reading — Brown Engineering Company
Scranton — The Chas. B. Scott Company
Wilkes-Barre — Eastern Pennsylvania Supply Company
York — George F. Motter's Sons
RHODE ISLAND
Providence — W. E. Lamarine
SOUTH CAROLINA
Charleston—The Cameron & Barkley Co.
Greenville — Hugh Black
TENNESSEE
Jackson — Southern Supply Company
Knoxville—Tenn. Mill & Mine Supply Co.
Memphis — Lewis Supply Company
Nashville — Keith, Simmons Co., nc.
TEXAS
Dallas — The Murray Co.
El Paso — Momsen-Dunnegan-Ryan Co., Inc.
Houston — Peden Iron and Steel Co.
UTAH
Salt Lake City—The Salt Lake Hdwe. Co.
VERMONT
Burlington — Hagar Hdwe. & Paint Co.
VIRGINIA
Lynchburg—Barker-Jennings Hdwe. Corp.
Newport News — Noland Company, Inc.
Norfolk — Taylor-Parker Company, Inc.
Richmond — Industrial Supply Corp.
Roanoke — Noland Company, Inc.
WASHINGTON
Aberdeen — Mill & Logging Supply Co.
Seattle — Chas. H. Harden Co.
Spokane—Wash'ton Mach'y & Supply Co.
Tacoma and Olympia — Ducharme Belting and Rubber Company
Yakima — Yakima Hardware Company
WEST VIRGINIA
Elkins — Valley Supply Company
Fairmont — Fairmont Supply Co.
Huntington — Banks-Miller Supply Co.
WISCONSIN
Eau Claire — W. H. Hobbs Supply Co.
Green Bay — Morley-Murphy Company
Milwaukee—Morman Belting & S'pply Co.
Racine — Mohr-Jones Hardware Co.
Sheboygan — Frank Geele Hdwe. Co.
Wausau — D. J. Murray Mfg. Co.

Longer Life Is One of Several Reasons to Specify Waterproof Research Leather Belting

Belt life is longer with Research Leather Belting than with other belts, leather or rubber, due to:

1. high frictional surface, less tension required to grip pulleys
2. greater pliability, less internal wear due to flexing — best for small-pulley drives, such as jordans
3. natural overload capacity — ideal for beaters
4. less stretch, better use of power, fewer delays for takeup — to be specified for drives where speeds are high and must be uniform.

On pivoted base drives, Research has double the life of rubber V-belts...on fixed-center drives, Research guarantees at least 3% more production.



Waterproof Research Leather Belting on Pump

GRATON & KNIGHT CO., Worcester, Mass.

WOMEN WORKERS ARE DOING THEIR PART

Women are helping to "Keep the Home Fires Burning" all over America. The Thilmany Paper Company, Kaukauna, Wisconsin, had a photographer take pictures of women workers in that plant to send to its men in the armed forces just to assure them that all is well on the home front and that the women will carry on until they return.

EDITOR'S NOTE: The pictures appearing on this page are published through the courtesy of the Thilmany Paper Company.

◆

McNUTT PREDICTS LARGER NUMBER OF WOMEN WORKERS

Paul V. McNutt, federal manpower commissioner, has estimated that by the end of 1943, 6,000,000 women will be employed in war industries.

Mr. McNutt said that a woman free from worry about her home is a better worker, and recommended staggered hours in armament plants to give them time to shop. He said that under rationing regulations, more time to plan meals and buy food is necessary. He said his agency anticipates a total working force of women—in all types of occupations—of 18,000,000 by the end of this year.

◆

NEW OWNERS WILL OPERATE TARENTUM MILLS FULL TIME

Tarentum Paper Mills, Tarentum, Pennsylvania, will be re-opened and production resumed on a full-time scale, according to the new owners, Simplicity Patterns, Inc., New York.

Tarentum was previously controlled by E. M. Love and the Union Collieries Company of Oakmont, and the purchase was transacted through Hazlett, Gannon and Walter, Pittsburgh attorneys and solicitors for the company. The original company name will be retained.

◆

PHOTOMETER PATENTED BY J. A. VAN DEN AKKER

A photometer has been invented by and a patent has been granted to J. A. Van den Akker, research associate of the Institute of Paper Chemistry, Appleton, Wisconsin. His rights have been assigned to the Institute.

The machine measures the special qualities of materials and substances. The invention enables light beams to pass alternately through a spectral sample and a uniform sector opening in alignment therewith and then through the spectral standard and the graduated sector opening in alignment therewith.

OUR biggest job comes after victory. Now we are all doing our utmost to produce for victory. All our thoughts and our efforts are concentrated toward that end. That's as it should be, but there is a much bigger job ahead and it fits in perfectly with our present program. When the war is over and victory is won, when the boys who today want ships, planes, tanks, bombs—and all the other implements and necessities of war; when those same boys want "jobs"—with honor—let's be ready. Let's be ready to help rehabilitate them, so that they can maintain their self-respect and dignity—no created jobs—but honest work, good wages and an opportunity to live the lives they planned yesterday. Let's keep expanding our facilities—improving our methods, and be ready to do our full share in a bigger, better program; the rebuilding of the world.

DETROIT PUBLIC LIBRARY

Pittsburgh Piping & Equipment Co.

10 FORTY-THIRD STREET PITTSBURGH, PA.

Woolworth Bldg., New York — Occidental Bldg., Indianapolis — Peoples Gas Bldg., Chicago — Union Guardian Bldg., Detroit
Public Sq. Bldg., Cleveland — 10 High St., Boston — 525 Market St., San Francisco

Briefs . . .

▶▶▶ A NEW PRODUCT, a greaseproof, noncorrosive paper, has been announced by Sherman Paper Products Corporation, Newton Upper Falls, Massachusetts, to protect highly finished metal parts against corrosion. This protective wrapping paper, V-26, is described as a new development in the packing of war materials, which eliminates multiple wrapping operations at point of use, thereby permitting substantial savings in time. Sherman packaging engineers worked in conjunction with the armed services and war industries in its development.

◆

▶▶▶ THE NO. 3 MACHINE at the Fddy Paper Corporation's plant in Three Rivers, Michigan, will be started up again to fill increased defense orders, according to George Radke, resident manager. The machine, which was shut down for lack of business in October, will build a special waterproof coated corrugated board for boxes used in shipping ammunition and supplies overseas.

◆

▶▶▶ MULTIWALL PAPER BAG manufacture will be started within a few weeks at Mobile, Alabama, by the Bemis Brothers Bag Company, in an effort to meet the rapidly increasing war needs for packaging in the South. The company is relocating at Mobile existing equipment to produce sewn and pasted, valve and open-mouth, multiwall paper bags. Manufacture at Mobile will in no way interfere with the other five Bemis multiwall factories.

◆

▶▶▶ REFORESTATION OF the nation's woodlands has been curtailed for the duration. Last year the United States Forest Service planted 53,465,000 trees in national forests, compared with 144,272,000 in 1941. According to the Service, there are still 2,400,000 acres to be planted in national forests, and at least 25,000,000 acres on all forest lands in the country; however, the tree planting of these areas will be postponed until after the war.

◆

▶▶▶ NEGOTIATIONS FOR the former International Harvester Company building at Ogdensburg, New York, have been completed by the Cleveland Container Company of Chicago, and the manufacture of paper and fabric cartons and containers for cheese and cheese products will soon begin. Operations will employ about 50 people. The building, idle for seven years, was formerly used as an assembly and distribution point for trucks and farm machinery.

◆

▶▶▶ FIRE IN A WAREHOUSE filled with baled waste paper at the United Paper Board Company plant, Lockport, New York, caused damage to material and equipment estimated between $50,000 and $75,000, according to Manager Leonard L. Hank. George H. Butts, freight agent of the New York Central Railroad estimated that an additional $2,000 damage had been caused to three freight cars loaded with paper.

◆

▶▶▶ A PERMIT FOR ALTERATIONS costing $5,000 has been granted the Hammermill Paper Company, Erie, Pennsylvania. Plans include the construction of additional lavatories and rest rooms and other improvements in the millwright building of the company.

◆

▶▶▶ A STEEL ROOF was blown off the Manistique Pulp and Paper Company, Manistique, Michigan, recently when the upper peninsula of Michigan suffered one of the worst snow storms of the year.

◆

▶▶▶ TO RELIEVE THE FATS AND OILS SHORTAGE, the Food Distribution Administration is asking the fats and oils industry for proposals to expand tall oil refinery capacity, because raw materials for this "extender" of fats and oils are unlimited. Tall oil is a wood pulp by-product.

◆

▶▶▶ ACCORDING TO the Missouri Conservation Commission, 327 of the 653 fires on protected districts of Missouri last year resulted from "harmless" fires to burn brush or debris getting out of control. Loss from the 72,496 acres of timber burned was estimated at $70,000.

◆

FINANCIAL

▶▶▶ ALTHOUGH THE STOCK MARKET during March showed a general rise in prices of securities to levels higher than any reached since shortly after the War began in Europe, paper mill securities did not follow the up-turn proportionately. It can be assumed that the restrictive orders on paper production exercised a braking effect on such securities, inasmuch as paperboard company producers showed material increase in values. Paperboards are not subject to as rigid production restrictions as paper mills.

American Box Board Company—Net profit for the fiscal year ending November 27, 1942, was $229,133 as compared with a profit of $436,410 for the preceding year.

American Writing Paper Company—Net profit in 1942 was $233,937 as against $353,494 for the previous year.

A.P.W. Paper Company—Net profit for the six months ending January 16, 1943, was $4,024 as against $76,734 for the comparable period the year before.

Bryant Paper Company—Net profit for 1942 was $231,740 as against a net of $314,065 in 1941.

Champion Paper & Fibre Company—Net income for forty weeks ending January 31, 1943, was $2,088,486 as compared with $2,291,746 for the comparable period in the preceding fiscal year.

Container Corporation—Net profit for 1942 was $2,401,748 as against $2,327,177 during 1941.

Crown Zellerbach Corporation—Net profit for the nine months ending January 31 totaled $5,327,483 as against $7,528,819 for the comparable period in the previous year.

Dixie-Vortex Company—Net profit for 1942 was $957,552 as against $933,802 in 1941.

Eastern Corporation—Net profit in 1942 was $444,216 after retiring $1,000,000 in notes due in 1943 and allowances for the closing of the Orono mill and closing out other investments.

Eddy Paper Company—Net income for 1942 was $475,408 as against $833,344 in the previous year.

Robert Gair Company—Net profit in 1942 was $707,191.

P. H. Glatfelter Company—Net profit in 1942 was $194,309 as against $271,820 in 1941.

Great Northern Paper Company—Net profit for 1942 was $1,686,528 as against $2,432,261 in 1941.

Hinde & Dauch Paper Company—Net profit in 1942 was $1,003,036 as against $1,112,195 in 1941.

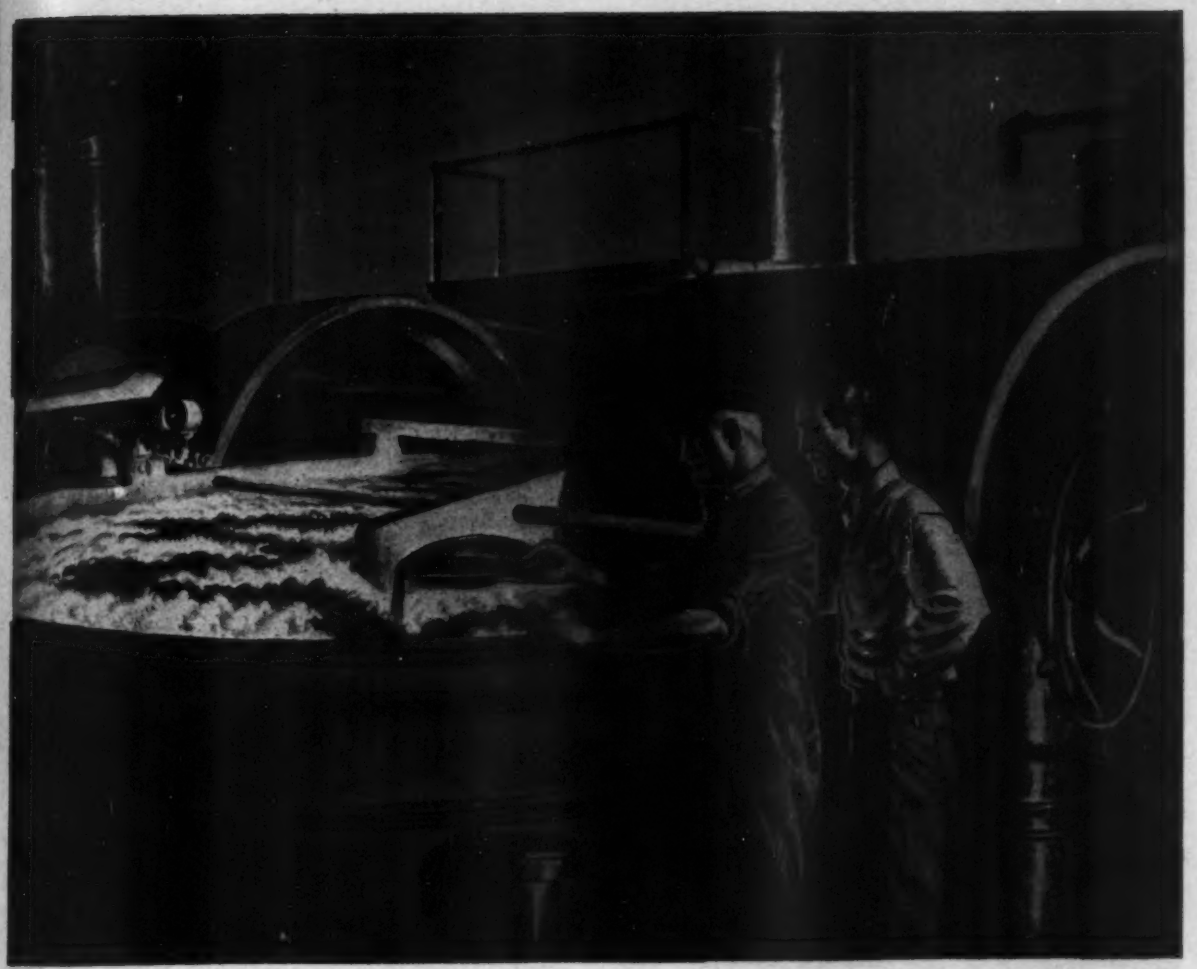
Hummel-Ross Fibre Corporation—Net profit in 1942 was $405,696 as against $604,145 in 1941.

Kalamazoo Vegetable Parchment Company—Net income in 1942 was $656,096 as against $833,995 in 1941.

Keyes Fibre Company—Net profit in 1942 was $210,945 as against $317,753 in 1941.

Kimberly-Clark Corporation—Net profit available for common share holders in 1942 was $3.25 per share as against $4.72 in the previous year.

Marathon Paper Mills Company—



THE DOLLARS AND SENSE OF USING H. & M. DEVELOPED FORMULAS

WITH a 10% cut in production today's reality . . . paper mills and their associates can well look to the future with a critical eye.

For conservation, a double-check on coloring procedures is in order. Dyestuff control, via H. & M. developed formulas, assumes a new and vital importance.

For in helping you to develop a new color match . . . H. & M. chemists focus on simplicity of formula and economy in the type and amount of colors used. Duplicating your mill operation under the most exacting laboratory conditions . . . they see the problem through your eyes. They satisfy your special requirements for fastness—to light, grease, alkalis, chemical solvents, bleeding. Here is the old "ounce of prevention" in new form—waste prevention. A workable H. & M. dye formula will prevent wasting furnish, power, labor. It will help you conserve your margin of profit under reduced dollar-volume.

Your mill superintendent and chemists are familiar with the Heller & Merz Shade Card . . . "Colors For Paper." It covers a wide range of general applications. But whenever a special condition presents itself . . . you are welcome to bring your problem to paper color headquarters—Heller & Merz.

Whatever the best dyeing formula is . . . we'll be glad to help you create it.

HELLER & MERZ DEPARTMENT

CALCO CHEMICAL DIVISION · AMERICAN CYANAMID COMPANY

BOUND BROOK, NEW JERSEY

Net income for the year of 1942 to October 31, was $1,193,047 as against $1,204,515 for the same period in 1941.

Masonite Corporation — Profit for the second quarter of three months ending February 28, 1943, was $1,277,745 before Federal and State income taxes and contingency reserves.

Munising Paper Company—Net income for 1942 was $394,315 as against $268,467 for the preceding year.

Nashua Gummed and Coated Paper Company—Net profit in 1942 was $429,261 as against $563,448 in 1941.

Oxford Paper Company—Net profit for 1942 was $777,336 as against $1,056,841 for 1941.

Puget Sound Pulp and Timber Company—Net profit in 1942 was $879,559 as against $1,076,178 in 1941 and $795,553 in 1940.

Rayonier, Inc.—Net profit for the fiscal quarter ending January 31, was $459,325 as against $527,757 in the preceding quarter and $927,083 for the comparable quarter a year ago.

St. Helens Pulp and Paper Company—Net profit in 1942 was $396,127 as against $481,651 in 1941.

St. Regis Paper Company—Net income for 1942 was $1,680,091 as against $3,228,080 in 1941.

Scott Paper Company—Net earnings in 1942 were $1,496,688 as against a slightly larger profit in 1941, though sales increased 18 per cent over 1941.

Taggart Corporation—Net profit for the year ending December 31, 1942, was $485,756 as against $820,130 for the previous year.

Union Bag and Paper Company—Net earnings in 1942 were $1,890,401 as against $2,168,383 in 1941. The company decided to omit the current dividend because of the uncertainty due to the War.

West Virginia Pulp and Paper Company—Net profit for the quarter ending January 31, was $764,718 as against $1,137,939 for the comparable quarter of the previous year.

When your castings are made by Cooper, you benefit by twenty years of scientific research in the development of new alloys and new methods of combating corrosion, heat and abrasion. No guesswork is permitted . . . the recommendations of our metallurgists are based on service reports covering hundreds of different uses of stainless steel, monel, nickel and special alloy castings.

Among the alloys we have developed is our designation CA22 which is widely used for economic service in sulphite pulp mills for digester fittings, pumps, valves, etc. A comprehensive chart giving analyses, characteristics and applications of Cooper standard alloys is yours for the asking. Write for it today.

THE *Only* ALLOY FOUNDRY WITH *All* THESE FACILITIES

- Laboratory control over raw materials and finished products.
- Dual foundry...both hand and machine molding.
- Heat treating of castings up to six feet in size.
- Machine shop . . . specially equipped for finishing stainless steel
- Improved cleaning . . . including Lustracast electrolytic finishing which leaves all surfaces bright.
- Castings furnished rough, polished or fully machined . . . one ounce to two tons.
- Development of special alloys to meet unusual requirements.
- Technical consulting service.

THE *Cooper* ALLOY FOUNDRY CO.
125 BLOY STREET • HILLSIDE, NEW JERSEY

New York Stock Exchange—Stocks

	Closing Prices March 25, 1943	Feb. 28, 1943
A. P. W. Paper Co....	*2½–2¾	2⅛
Celotex	13	10¾
Same Preferred.....	*85–87½	87½
Certain-teed	6⅛	4⅞
Same Preferred.....	58	40¼
Champion P. & F. Co.	18½	18⅜
Same Preferred.....	103¼	104
Container Corp.	22⅜	21⅛
Cont. Diamond	13¾	10¾
Crown Zellerbach.....	13⅛	13⅜
Same Preferred.....	88¾	90
Dixie Vortex	13⅝	12
Same "A"	*39¾–39⅞	*38½–39¼
Robert Gair	3½	3¾
Same Preferred.....	12¾	12⅝
Gaylord Container....	14	13⅜
Same Preferred.....	*52½–53	*51–54
International Paper....	12¼	10½
Same Preferred.....	59½	56⅞
Kimberly-Clark	29	29¼
MacAndrews & Forbes	23⅛	*24⅛–24
Masonite	*35½–36	36¼
Mead Corp.	9	8½
Same Preferred.....	86–88½	87
Paraffine Cos	*39–41	39⅜
Same Preferred.....	*98½–101	*97¼–104
Rayonier	13⅜	12
Same Preferred.....	*28¾–29	.....
Scott Paper	41¼	*41–42
Same 4½% Pfd..	*112½–113	*113–114
Same 4% Pfd.....	*110–113½	*111–114
Union Bag & Paper..	11⅛	11½
U. S. Gypsum.....	68¼	65
Same Preferred.....	179	*175½–176

New York Stock Exchange—Bonds

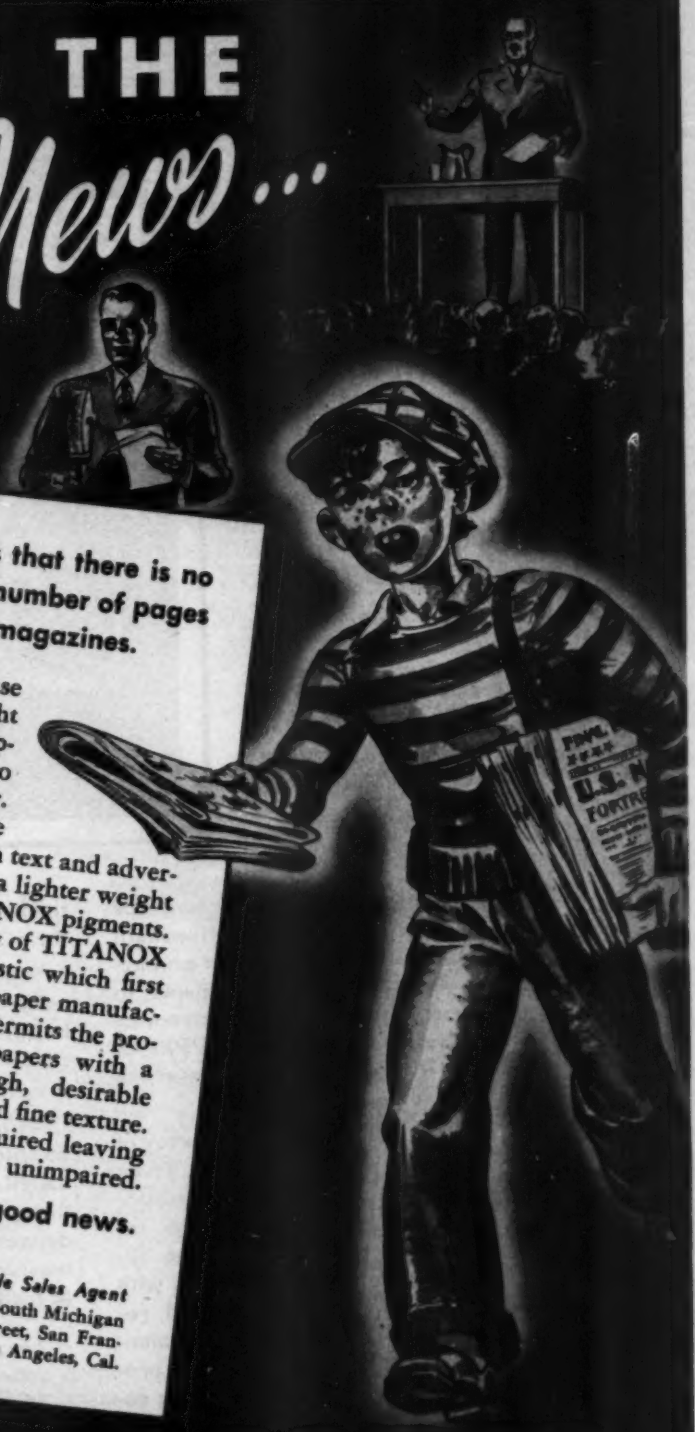
Abitibi 5%	62	.....
Celotex 4½%	102⅛	101⅛
Certain-teed 5½%....	99¼	98½
Champion P. & F. Co. 4¾%	.....	.....
International Paper 5%	104	.....
Same 6%	106½	.....

New York Curb Exchange—Stocks

Am. Boxboard	6¼	6
Great Northern	35	31
Hummel Ross	5¼	4
St. Regis	2¾	2⅞
Taggart	3⅝	3⅞
United Wall Paper....	2¾	2⅞

*Closing Bid and Asked Prices.

SPREAD THE *Good News...*



Tell your customers that there is no need to reduce the number of pages in books and magazines.

Reduction of paper use by ten per cent of weight based on 1942 consumption, should bring no hardship to any publisher. He still can have all the pages he requires for both text and advertising — provided he uses a lighter weight stock opacified with TITANOX pigments.

The outstanding opacity of TITANOX pigments is the characteristic which first attracted the attention of paper manufacturers. This high opacity permits the production of light weight papers with a minimum of show-through, desirable whiteness and brightness and fine texture. Only a small loading is required leaving the strength of the paper unimpaired.

Tell your customers this good news.

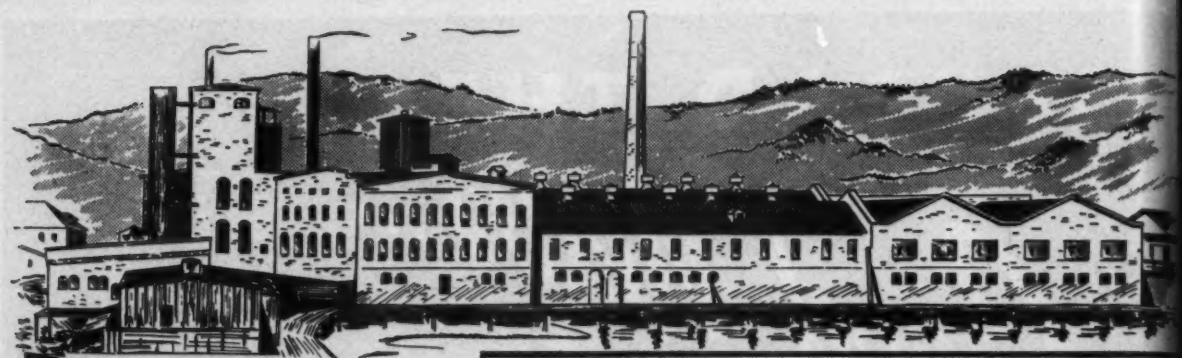
TITANIUM PIGMENT CORPORATION, *Sole Sales Agent*
111 Broadway, New York, N. Y. • 104 South Michigan Ave., Chicago, Ill. • 350 Townsend Street, San Francisco, Cal. • 2472 Enterprise Street, Los Angeles, Cal.

TITANOX

TITANOX

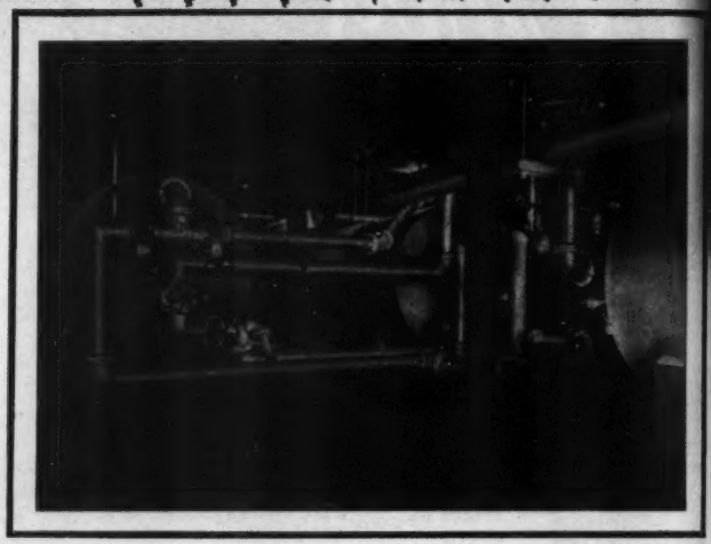
TRADE MARK

OPACITY • WHITENESS • BRIGHTNESS



Rescued

FROM THE BOTTOM OF A RIVER



Some time ago a large paper manufacturer in Wisconsin decided to convert his production from wrapping paper to fine bond paper. With a raw water coming from the river and containing 300 PPM of coloring matter, it was obviously necessary to provide filtering equipment.

After a survey of the problem, seven Graver Pressure Filters were installed. These filters, together with enlarged and remodeled sedimentation tanks, provided adequate capacity for a daily thruput of three million gallons and reduced the coloring matter to the desired point.

Then came the flood — a cloudburst which raised the river to a point where part of the buildings were washed away and some of the filters and other equipment were dropped into the river.

After being subjected to a terrible beating, the filters were raised from the river and reinstalled. Today—back in normal operation—these same Graver Pressure Filters are again delivering clear, filtered water that meets the most rigid requirements in the manufacture of high grade sulphite and bond papers.

This, of course, is an exceptional case, but it does illustrate the ability of Graver Water Conditioning Equipment to deliver complete satisfaction. Whatever your water conditioning problem may be, you'll find it to your advantage to consult Graver. There's no obligation.

GRAVER

GRAVER TANK & MFG CO., INC.

NEW YORK
CATASAUQUA, PA

4809-59 TOD AVE.
EAST CHICAGO, IND

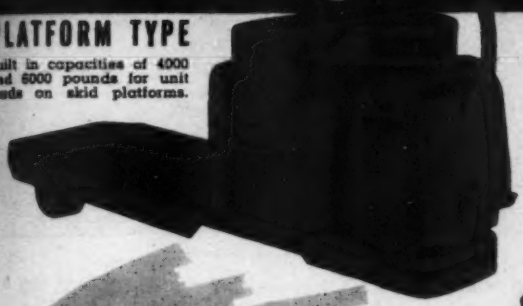
CHICAGO
TULSA

ad-18-W

THIS MECHANIZED HANDLING SAVES WASTE IN MANPOWER AND TIME . . . .

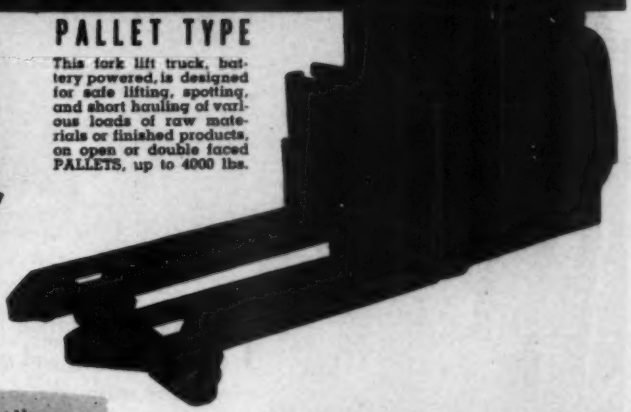
PLATFORM TYPE

Built in capacities of 4000 and 6000 pounds for unit loads on skid platforms.



PALLET TYPE

This fork lift truck, battery powered, is designed for safe lifting, spotting, and short hauling of various loads of raw materials or finished products, on open or double faced PALLETS, up to 4000 lbs.



POSITIVE MECHANICAL BRAKE

FRONT WHEEL POWER DRIVE

CONTROLS IN STEERING HANDLE

Automatic TRANSPORTER

FORWARD AND REVERSE SPEEDS

SHOCKLESS HYDRAULIC PLATFORM LIFT WITH EASY FOOT CONTROL

★ The TRANSPORTER performs a vital service in keeping materials moving on those short hauls from one process to another. This mechanized handling of small loads will simplify your entire materials haulage system whether in cramped quarters or narrow aisles . . . it speeds things up and entirely eliminates straining, tugging, pulling, or extra pushing on part of trucker.

● Full power can be attained in steering at any angle through a 210-degree range, making it easy to break out loads from storage with little maneuvering. Sufficient power is available so that no extra manual push or pull is necessary to help the truck over toe plate humps or elevator ridges.

AUTOMATIC TRANSPORTATION COMPANY

DIV. OF THE YALE & TOWNE MFG. CO.

113 W. 87TH ST. CHICAGO, ILLINOIS

SEND COUPON TODAY

AUTOMATIC TRANSPORTATION CO.
113 W. 87TH ST., CHICAGO, ILL.

Gentlemen: Please furnish complete information on the "TRANSPORTER" without obligation.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

THE War Production Board has restricted the use of fuel, lubricants, chemicals, wood pulp and man power. To supply the publishers of magazines and newspapers with the necessary printing surface from reduced tonnage of paper, many mills have been obliged to shift to the manufacture of lighter weights. You can get maximum production from your present quota of materials and supplies by equipping your paper machines with Hamilton Felts. By removing more water in shorter time, Hamilton Felts enable you to run your machines at higher speeds. They reduce the load on the drier rolls and thereby cut fuel bills. By giving better formation to the sheets, Hamilton Felts reduce broke. And because they last longer Hamilton Felts cost least.

From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

Miami Woolen Mills

Hamilton Felts

Established 1858

For easier handling in grease guns ...longer life in anti-friction bearings

A war-bred grease for wartime jobs. Today's production pace demanded this new type grease. Longer hours of operation alone call for a more stable grease to resist heat and oxidation, while the need for more frequent lubrication of bearings makes an easily handled gun grease an asset.

Stanobar brings you both these advantages. It's a smooth (not fibrous) type grease. It contains inhibitors which reduce oxidation of both the soaps and oil in Stanobar. That means less cleaning of bearings and less labor and lubricant required to flush out old grease.

Stanobar resists thinning out when worked—that helps reduce leakage. It may also enable you to replace two or three grades of grease you are now using with this one grade of Stanobar.

Let a Standard Lubrication Engineer explain some of the other advantages of new Stanobar—and help you make a test. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

How to service ball and roller bearings. Proper packing of bearings after inspection is highly important. Bearings equipped with pressure fittings are sometimes replaced dry and filled with a grease gun, but a careful, hand-packed grease job is well worth the little extra time it may take. The illustrations at the right point out some of the steps to take.

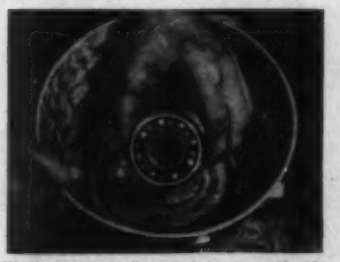
OIL IS AMMUNITION...USE IT WISELY

CHECK THESE ADVANTAGES OF NEW STANOBAR GREASE

- ...Easily handled in grease gun or pressure system.
- ...Resists thinning-out when worked.
- ...Does not oxidize and form deposits.

Clean motor and bearing housing before removing bearing.

Remove bearing, wash it in kerosene, and dry thoroughly with a clean cloth.



Dip bearing in a light lubricating oil. Allow excess to drain before repacking.

Put grease only in depression of spacer (both sides). Then spin one of the races, and wipe off excess grease thrown out. Replace the bearing. Do not put additional grease in the bearing housing.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUB

COLOR GETS ATTENTION

COLOR gives added control. It provides quick, positive identification.

In thousands of plants throughout the country, color speeds up operations involving the selection of one item from a group of items—helps prevent costly mistakes. Color is necessary in the efficient handling of forms, messages and the speedy transmission of vital communications. Dyes are also important for identifying many essential packages and labels.

Today new paper products bring new color problems. To help you meet these new conditions, Du Pont dyestuffs technicians offer vast experience with dyes and their proper application. They can help you unite paper and color most effectively and economically. E. I. Du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Dyestuffs Division, Wilmington, Delaware.

DU PONT DYESTUFFS
REG. U.S. PAT. OFF.

DYESTUFFS

BETTER THINGS for BETTER LIVING...THROUGH CHEMISTRY

Editorial

Paper---an Essential Commodity

▸▸▸ THE POPULATION OF the United States approximated 130,000,000 people in 1937, according to the U. S. Bureau of the Census. During that year the per capita consumption of paper in the country amounted to less than one pound per day.

The wood pulp production of the United States in 1937 was 43 per cent of the wood pulp production of the world; yet, the population was only 6 per cent of that of the world.

Such statistical data are ample proof of the essentiality of paper in this country. A continuous, uninterrupted supply is indispensable to all commercial, industrial and domestic economies and to the morale of the people.

Although paper is a vital and critical factor in the winning of the War, the War Production Board has not yet denominated the paper industry as essential. The industry, however, is looked upon by the War Manpower Commission as essential since the officials of the Commission have on different occasions requested employees within the industry to remain on their present jobs rather than to seek employment elsewhere.

The people of the United States need their daily supply of paper. They cannot get along without it. They consume paper as they do water and milk. For a long time they have had plenty of it, and for that reason they seldom give a thought to its value and its worth.

This attitude is not one of indifference. The essentiality of paper just hasn't come into their consciousness.

The paper industry has an interesting story to tell the public. *Now* is the time to tell it.

There are many ways the job can be done; but the important fact to drive home is that *paper is an essential commodity—both in war and in peace.*

Victory Gardens

▸▸▸ COMMENTING UPON THE VICTORY GARDENER, T. H. Everett, horticulturist, New York Botanical Garden, has said, "In this world-wide War, in which every American plays a part, every productive vegetable gardener helps our national well-being and is an aid to Victory."

Our Government in numerous ways has brought the problem of foodstuffs directly home to every American citizen. For the duration, at least, there will be limited quantities of some foods, others will be missing from our tables.

It is the purpose of Victory Gardens—the idea of which has spread like wild-fire over the entire country—to ease this food situation as much as possible. If every family in position to have a Victory Garden takes proper care of it throughout the growing season, there should be an abundance of fresh vegetables for everyone—regular sources of supply will then be adequate to meet the needs of those who are unable to have gardens.

Since most pulp and paper mills are located in small communities, it should be rather easy to locate land suitable for such a garden within close proximity of nearly every mill, possibly on mill property itself. Perhaps your mill already has allocated space for such an employee project. Maybe it has gone so far as to have the ground prepared for planting, or have developed a set of simple rules governing the acquisition and care of a garden plot by an employee. It should not be overlooked that many of these gardens will require suitable protection during the summer and fall.

Every mill should participate in this Victory Garden movement. To make it more interesting, possibly some competition might be arranged among the gardeners on an individual project; or where several mills are sufficiently close together, they could enter into a garden contest with each other. The effect of individual competition or of a contest among several participating mills would stimulate the interest of all those taking part.

The Victory Garden is much more than a source of fresh vegetables and vegetables for canning for the individual mill family—It is both a morale builder and health builder as well. In other words, it helps to sustain a better and more-efficient working force—the key to winning the War on the home front.

Size Trimmed---but Nothing Deleted

▸▸▸ THIS ISSUE OF THE PAPER INDUSTRY AND PAPER WORLD comes to you in slightly smaller size. Most of our readers understand that the War Production Board has issued an order to publishers curtailing their use of paper ten per cent in 1943 as compared to tonnage used in 1942.

This magazine has endeavored to conform to the required cut in paper use without eliminating any of the regular material its readers have been receiving. For this reason, the trimmed size has been reduced to 8⅛ x 11¼ inches. There has been no reduction in the size of the printed page, and the general characteristics have been retained with one exception: The book is now fastened with a single stitch, which reduces the consumption of stitching wire 50 per cent.

THE PAPER INDUSTRY AND PAPER WORLD will continue to give its readers the same quality and variety of editorial content.

Current Thought

The Sword is Safer than The Paper Machine

WILLIAM SIBLEY

▸▸▸ A BATTLE-SCARRED top sergeant was speaking: "When I blow this whistle, I want to see you men come out butchering. I want to see you cut these Japs up, down and crosswise!"

Twenty viciously poised soldiers burst from their lines at his signal, carrying rifle-mounted bayonets on guard. The tough voice urged them on. "Long thrust!" it roared. "Retrieve! Short thrust! Short guard! Jab! Slash, slash, slash!" A scabbard whistled past the sergeant's ear. "Mitchell," he shouted, ... You wanta kill somebody?"

Inconsistent? Hardly. For the scene of this bit of byplay was an American training camp, where peace-loving lads are learning the technique of war the safe way. Early bayonet training is done with covered bayonets for the sake of safety. When an unsnapped scabbard flies off in the excitement of jabbing Japanese-dressed dummies, it is possible for a man to get seriously hurt. For these boys aren't merely playing rough, they ARE rough.

How the Army, Navy and Marines are successfully training division after division of American boys with scarcely any disastrous accidents is a safety man's dream. Even the training of men under live ammunition whistling overhead,—which Marines, Commandos and tank destroying troops undergo,—has been singularly unproductive of any serious accidents.

At least a part of this humanized phenomenon may properly be ascribed to the growth of industrial safety beginning more than two decades ago. In business, lowering an accident rate by applying safety methods means fewer injuries; lower compensation payments for the insurance companies; lower insurance rates for employers. In war, an injured man, whether his wounds are by enemy or accidentally inflicted, is a casualty. Casualties take up the time of active personnel at the rate of five to one. Casualties can lose a war.

It is, therefore, not surprising that the planning of any major U. S. campaign takes into consideration so many unnamed, obscure factors of safety; all of which contribute toward keeping the individual soldier a fighting man. Proof of this can be found in any reportorial account of the North African campaign. Soldiers have been provided with individual water purifying equipment, salt tablets, sand fly netting, special sun-dust goggles, and when the first wave of troops stormed the shore they waded in, armpit high, sporting waders designed by the Quartermaster Corps. Each carried sulfa drugs to sterilize any non-fatal wounds inflicted by the enemy.

Soldiering is all dangerous. Possibly the two most hazardous branches are Ordnance and Engineering. Paradoxically, both branches bypass danger like a wolf stealing bait from the Canadian trapper. By a process of familiarity with the dangerous parts of their work these branches sidestep pitfall after pitfall. One engineering combat regiment reported less than 1 per cent of its hurts were accidentally self inflicted in line of duty.

Machinery manufacturers and all the men who design tools and fighting implements for our soldiers are playing a major role in keeping war safe. An ordnance technician designs a safety lock, holding the firing pin assembly of a rifle under 55,000 pounds of pressure *safely* only four inches away from Johnny's face. A cannon manufacturer covers the operating deck with special corrugated safety footing material so Johnny will not slip and break a leg while bombs are dropping nearby. Specially designed wire rope protects Johnny's hands from dangerous punctures. The company building an army order of power shovels carefully keeps up its high civilian standard of totally inclosed gears for Johnny's safety (if Johnny happens to be an operator). If Johnny loses a hand, an enemy bullet will have to knock it off, for the chances are there's fewer whizzing saws, exposed gears, and rickety ladders in Oran or Guadalcanal or Algiers than there is back home on Grandpa's farm, much less the average paper or pulp mill.

At a certain camp recently a new second lieutenant ordered lumber for a training obstacle course. When the young shavetail failed to specify dressed lumber for a foot wall, the colonel in charge gave the young man the dressing down he should have specified in the boards.

"Lieutenant," he stormed, "we don't want these men to get splinters in their hands and knees."

This piece was not written about training in the United States. With no official connection, it was told to me by a man who was (and will be again) in a far flung armed outpost where vital, dangerous work is going on each day—the kind of work which holds insurance rates up in the States. In a ten-mile radius, 1,700,000 man hours has been expended with nothing more serious than two injuries causing loss of working time. One Navy carpenter sawed two fingers off with a mechanical hand saw (after he removed the guard); one lad broke an ankle in the moving tread of a tractor; both preventable accidents.

On the same job, two men were laid up in a hospital by a fighting sailor who beat their faces in with a beer bottle. It would be interesting to compare the man-hours lost in the hospital with the man-hours lost in the brig. Safe methods so pervade the service that errors of human frailty result in more lost time than Old Man Accident can dig up! Interesting, too, after the War will be a comparison of accident-casualty rates of the armed forces with that of contemporary industry. More than likely, statistics may prove that Junior, dealing out murder in the Army, has been actually safer than Mom, who works at home, or Dad, who works in a gun factory!

Have you heard about our by-product?

It's weightless. It's invisible. It has no formula or properties. But it's precious, just the same.

Call it "know how"... the valuable by-product accumulated through more than half a century's experience in half a hundred industries. Scores of manufacturing problems . . . in every field from soap to glass, textiles to war gas . . . have sharpened the skill and widened the scope which make up Wyandotte "know how" today.

In war or in peace, there have been no priorities on this "by-product." Though we are busily at work with urgent victory orders, our technical assistance and copious background in the handling of basic chemicals are always available to serve you.

Tomorrow, with the return of peace, Wyandotte facilities as well as "know how" will be available in even greater abundance . . . working with you toward a new and better world.

Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and The J. B. Ford Company to better serve the nation's war and post-war needs.

Wyandotte

OFFICES IN PRINCIPAL CITIES

WYANDOTTE CHEMICALS CORPORATION • MICHIGAN ALKALI DIVISION • WYANDOTTE, MICHIGAN

SODA ASH • CAUSTIC SODA • CHLORINE • BICARBONATE OF SODA • CALCIUM CARBONATE • CALCIUM CHLORIDE • DRY ICE

FIG. 1

THERE are several methods of depositing metal so as to successfully rebuild worn equipment of Monel and other critical materials.

One—arc welding—is discussed here.

Others, namely, gas welding and metallizing will be considered in future "notes".

RECONDITIONING OF MONEL PUMP SHAFTS AND RODS BY ELECTRIC-ARC WELDING

Welding is employed usually to recondition worn pump shafts larger than 1½ inch diameter, however, welding may also be used with shafts as small as ½ inch diameter. The method of reconditioning Monel shafts and rods consists of three principal steps:

1. PREPARATION FOR WELDING

The surfaces to be built up must be clean. Foreign substances such as greases, corrosion products and particles of packing should be removed by rough machining, grinding, filing, or wire brushing.

2. ELECTRIC-ARC WELDING*

Downhand welding is best for reconditioning shafts. The electrode is held at an angle of about 20° from the vertical, ahead of the puddle. This permits control of the molten flux and eliminates slag trapping. A short arc (24-27 volt) should be maintained during welding. The recommended electrode diameter and current ranges for different sizes of shafts and rods are as follows:

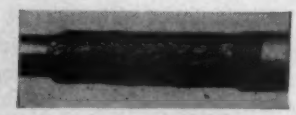


FIG. 2—Completed weld build-up with uniform rows of overlapping beads has high strength and toughness.

* Bulletin T-2, "Welding, Brazing, and Soft Soldering of Monel, Nickel, and Inconel" gives detailed instructions.

ELECTRODE DIAMETERS AND CURRENTS

Shaft Size	*Welding Electrode*	*Current Range*
	130X Monel Electrode	
Dia. inches	Dia. inches	Amps.
½	.075 or 3/32	25-40 or 45-60
¾	3/32 or ⅛	45-60 or 60-95
1	⅛	60-95
1½ or larger	5/32	80-150

Distortion of the pump shaft is controlled by keeping the welding heat low, and by laying down the welding beads longitudinally in sequences as shown in Figs. 3 and 4. This equalizes the effects of heating and cooling. Each weld

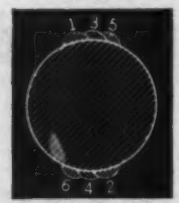


FIG. 3—Sequence for laying down welding beads on shafts 2-inch diameter and smaller.

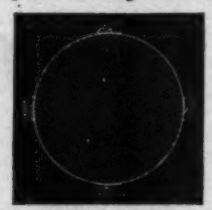


FIG. 4—Sequence for laying down welding beads on shafts larger than 2-inch diameter.

should be cleaned of flux and wire brushed before the adjacent bead is laid. The size of the beads and the welding speed should be uniform.

3. FINISHING

The completed weld deposit is machined. No special cutting tool is needed—a high-speed tool is preferable, but a plain carbon steel tool is satisfactory for this limited amount of machining. The cutting tool should be ground as shown in Fig. 5 and the work turned at a speed of 55-60 ft. per minute with .005 inch feed. A rough and finishing cut is taken, leaving enough metal for filing and lapping to finished size.

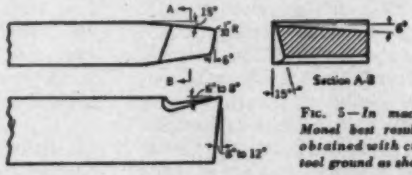


FIG. 5—In machining Monel best results are obtained with cutting tool ground as shown.

★ ★ ★

Questions concerning the reclamation of equipment by welding or other methods of metal deposition should be addressed to INCO'S TECHNICAL SERVICE.

Copy of the article "How to Recondition Worn Pump Shafts and Rods," will be sent on request. The International Nickel Company, Inc., 67 Wall Street, New York, N. Y.

★ ★ ★ ★ ★ INCO NICKEL ALLOYS ★ ★ ★ ☆ ☆

MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • NICKEL • "Z" NICKEL

Sheet... Strip... Rod... Tubing... Wire... Castings

To be permitted to unfurl an Army-Navy "E" in token of a production job well done is a signal honor and every member of the Shartle organization is deeply appreciative. May it serve as an ever present reminder of the heavy task still before us and spur us on to redoubled efforts.

Shartle Bros. Machine Co., Middletown, Ohio

PRODUCTION MEN *prefer* DE LAVAL

1. De Laval Worm Gear drive gives even and constant transmission, without slipping, vibration or noise.

2. It is unaffected by grit, dust or moisture, and requires no readjustments for wear or stretch or for changes in atmospheric conditions.

3. It requires practically no attention.

4. It offers the greatest flexibility in the location of the motor and is the most compact of all drives.

5. It creates no fire or personal accident hazard.

6. It is highly efficient, improves with use, and has an almost unlimited life.

7. It is available in a wide range of horsepowers, standardized center distances and ratios.

• • •

In all principal cities there are experienced De Laval engineers who will give you immediate and competent advice in the solution of drive problems. Ask for Publication W-1131.

DE LAVAL WORM GEAR DIVISION
of the De Laval Steam Turbine Co., Trenton, N. J.

WOMEN CHEMISTS *in the Paper Industry*

LOIS HANS
Hercules Experiment Station
Hercules Powder Company

Right—Miss Hans in the laboratory.

▸▸▸ "WE REGRET TO INFORM YOU that we would not consider placing a woman on our technical staff." So reads an excerpt from a letter received from a leading paper mill less than two years ago.

Many years of active and acceptable experience, in the specific requirements for the opening this mill was trying to fill, were nullified by the sex of the applicant. The same answer was also given by other mills until the present technical labor shortage. Today those mills are searching for trained female technicians.

Pioneer Paper Women

The women who have been pioneers in technical work for the pulp and paper industry are all distinctively individualistic in their own way. They had to be, or they would not have been successful in acquiring their present positions, nor would they have survived in the industry. The women chemists briefly described have been active in the field for more than ten years; these women are among the most widely known, although no doubt there have been others who have contributed much to gain recognition for women's ability to master this field. No attempt has been made to list their chemical achievements, but rather an effort has been made to draw thumbnail sketches of them as feminine personalities to counteract the popular conception of a woman chemist as a colorless, unattractive individual wearing horn-rimmed glasses, who is completely lost away from her test tubes. The successful technician is a person who can work hard at the job and still find time to be a balanced individual.

Helen U. Kiely, Technical Director of American Writing Paper Corporation, is undoubtedly one of the women chemists most widely known by technical paper men and dealers. Helen is known from coast to coast, and during her extensive travels, her dynamic personality has done much to give the sales representatives and customers of her firm an enthusiastic respect for the technical control established over their products. No TAPPI convention seems quite complete without her gay, clear laugh. She is a crackerjack bridge player and is the center of the social activity wherever she is.

Louise E. McGrath, Vice President of Booth Chemical Company, became well known among mill men while installing and servicing white-water treatment and slime-control systems in mills throughout the United States and Canada. Louise has mastered the difficult art of subduing her own personality while working under the most adverse conditions, so much so that she is accepted as "one of the boys." On the outside, she is a charming hostess and a good cook.

Dr. Jessie E. Minor, chief chemist at Hurlbut Paper Company, has been well known for her work in the rag paper field for the past twenty years. She has had an interesting career outside of the paper field, as she has taught in South Africa, and has directed her own commercial laboratory for a period of several years. Conversations with her can be most interesting and varied.

Lena Kelly, chemist at American Writing Paper Corporation, is a small, attractive woman whose quiet charm and air of responsibility earn respect for her ability from those who cross her path. Her cordial, sincere hospitality makes it a delight to know her.

R. M. Karapetoff Cobb, chemist in charge of the Research Laboratory at the Lowe Paper Company, received her training at Tufts and M. I. T. She can keep any group in a technical meeting sitting up and taking notice through her witty comments and clever jokes aptly illustrating the subject under discussion.

Jean Maxfield, with the Sealright Corporation, is probably the pioneer bacteriologist working directly in a paper mill. Although her work is well known in her specialized field, she is such a retiring individual that the rest of the industry has had little opportunity to know her personally.

There were many logical reasons for the discouraging attitude toward the general acceptance of women technical workers, including:

1) The location of the mills and character of the work.

2) The attitude of the mill men toward hiring women technical workers, and

3) Women's lack of training to meet the demands for this work.

Working Conditions

Because of water requirements ranging from 8,000 to 90,000 gallons per ton of paper produced, the enormous storage space required for raw materials, proximity to pulps, fuel, markets, and other factors, the majority of paper mills are located in out-of-the-way sections which frequently have no reliable means of pub-

lic transportation; such areas were considered undesirable for properly-reared young women to pass through unescorted. Personally-owned automobiles and the public's acceptance of a greater freedom in movement for women have reduced the inaccessibility of such mills.

Well within the memory of the present generation, paper machines were operated with 11- and 13-hour shifts, or, in some mills, with 10- and 14-hour shifts. The men responsible for production (and this group often included the chemist) frequently stayed on the job straight through one shift period and then through a large part of the next shift when special runs were being made, or when the paper coming across the machine was falling short of specification, since there is a 3- to 5-hour period elapsing from a change in furnish in the beater room to the paper rolling off the dry end of the paper machine.

The problems popping up wherever paper machines are, and which require the assistance of the chemist, rarely present themselves within an orderly schedule; many of these problems cannot be laid aside at the regular quitting time for attention on the following day. But the occurrence of these emergencies is not frequent enough in most small mills to justify the employment of a staff of trained chemists to be present in the mill 24 hours daily.

Other physical conditions retarding the employment of women in some mills include the meager wash room accommodations available in the average mill, with no special provisions for women. In many mills, a minimum of clothing is worn by many workmen around the machines during hot weather, or between changing of shifts. These workmen have resented the curtailment of their customary liberty. This situation is rapidly being corrected by a changing attitude on the part of the mill men, and by adequate locker rooms and change facilities in the mills now hiring women.

The floors in many of the older mills were always wet and very often dirty, particularly so in those mills using waste papers. Cockroaches and rats frequented many of the store rooms for untreated rags and waste paper. Can you blame the average mill employer for hesitating to bring any squealing, squeamish females into the mill to disrupt the customary working practices?

In the old days, accidents were not infrequent. The ancient belt drives occasionally broke and whipped out to strike down any unfortunate workman within reach. Poorly protected calender nips, gears, and other moving parts could, and often did, play havoc with loose clothing or too adventuresome fingers. Accepted feminine apparel of the period was not fitted to activity in the old-time paper mill.

Safety and clean-up campaigns, improved machinery design, and modern trends in working conditions have removed most of the serious handicaps to the employment of the woman technical worker in the average paper mill of today. The wide choice in suitable feminine working apparel now available make her appearance and mode of dress more appropriate and suitable to the job.

Attitude of Mill Men Toward Women Chemists

Paper men, with justification, considered their field a strictly masculine world. The paper industry is very old, and is encrusted with tradition. Its trade secrets, skills, and customs have been passed down from one generation to the next with an accompanying strong clannish feeling. Newcomers, especially those proposing revolutionary methods or changes, were forced to prove themselves the hard way before being accepted. Competition was keen, at times even cut-throat.

Less than twenty-five years ago, a very large percentage of the paper mills in this country did not employ technically trained chemists. The first chemists introduced to many of these mills were viewed with suspicion and resentment by the machine operators, and some of these chemists failed to gain the co-operation and confidence of the workmen in the mills. There are many points in the papermaking system that unco-operative operators could regulate to discredit the suggestions of a disliked technical man, without his being able to trace or remedy the cause unless he knew the entire system and the mechanism of the machine intimately. That degree of familiarity and skill comes only with hard work and experience, and cannot be picked up entirely in textbooks or school laboratories. The chemists who did succeed were those who had adjusted themselves to the job in the manner recommended by Charles A. Higgins, president of Hercules Powder Company, at a recent meeting of the Delaware Section of the American Chemical Society. He stated that the chemist had the best chance for advancement in industry who would lay aside his highly technical vocabulary, roll up his sleeves, and go to work. The chemist should acquire the business man's language and viewpoint in making reports to busy executives, and also be able to converse with the mill operators in their own familiar terminology.

Although many present-day successful paper mill executives started in the mill laboratory, the memory of their own early struggles caused them to hesitate before introducing such a novelty and possible handicap to that work as the employment of women for technical control work in the mills. However, the majority of these men are co-operating with women who have proved their ability to do the work and to fit into a mill organization. Comparatively few men continue opposition to women after the initial adjustment to the idea of a woman handling a traditionally masculine job, and the men who have extended the greatest encouragement and assistance to the woman novice in their field have usually been among the most progressive and successful in their work.

The present war labor emergency will undoubtedly accustom workmen to laboring side by side with women, and eventually will lead to an acceptance of ability, whether possessed by a male or a female, as the criterion of fitness for filling a paper mill job.

Women's Training for Technical Work

Girls have been successfully passing the regular science courses offered by universities and colleges for years, but fields other than the paper industry have offered greater appeal and opportunity, with less resistance, to these graduates. The paper industry offered nothing in particular to stir the impulses of the crusading type of woman bent on humanitarian service or social reform. Although papermaking is a highly specialized art recognized by men for generations, it is not the type of art for which a trained woman chemist would be willing to starve rather than give up.

There has been a complete lack of formal training of women for technical jobs in the paper industry. Few of the recognized schools contacted which offer advanced specialized training for the paper industry have admitted girls to their enrollment, although some are giving consideration to the establishment of limited courses in paper technology to which they may admit girls.

A majority of the men entering technical work in pulp and paper mills started working at odd jobs throughout the mills during their school vacations, and thus became familiar with the labor work connected with the entire process. This experience be-

comes an extremely valuable background in advanced technical work in the industry. It has been practically impossible for a girl to acquire the same background, and this lack of practical training constitutes a further disadvantage for women in competition with men for this work.

It is not surprising, therefore, that an examination of various membership lists of the A. C. S. and of TAPPI reveal only approximately 0.5 per cent women among those specializing in the pulp and paper field. There are, of course, a few women in the field who have not become members of these organizations, but, since there are also many more men in the field who are also nonmembers, this ratio would probably remain the same.

The shortage of technical personnel during the first World War opened the door of the paper mill laboratory to a few women who have remained and gained recognition for their work. The United States Government laboratories specializing in paper problems have admitted a few women for a limited number of jobs which gave them the basic experience necessary to handle industrial jobs later. A few girls, if there were no sons in the family, had been allowed to tag around the mill at their fathers' heels while growing up, and later to help their fathers in the mill and machine shop, thus gaining practical experience.

A bull-dog determination can always provide some means of learning the technique of doing any job. Taking correspondence courses, attending the evening classes given in many universities, keeping up with the technical literature, and taking every opportunity for observing skilled operators at work, can furnish the specialized training omitted in the more conventional education open to women.

A clerical job in the organization can sometimes place a wide-awake girl in a strategic spot to benefit through an unexpected emergency or absence of available manpower for a technical job. Within the past few years, a number of the larger and more progressive paper mill organizations have created research laboratories providing a larger number of opportunities for jobs requiring little or no direct work in the mills. Some of these organizations had admitted a number of technically trained women even before the present wide-spread skilled labor shortage.

The war has drained away so many trained men that several reliable sources have estimated that more than 50 per cent of the paper and pulp mills already have used women, or are contemplating using them as replacements in many places, most frequently as assistants in the laboratories. Because of the absence of a supply of women trained for the industry, untrained workers or graduates without practical experience have been assigned to jobs which had been analyzed and divided so that a minimum period of training in the mill would be sufficient to enable these women to handle the jobs. Special accommodations have been installed and many mills are offering equal pay for equal work to these women. They were hired with the understanding that the jobs are to be refilled by the men after their return from war duty.

Several leading personnel directors were consulted on their experiences with these women recruits. They all stated that the women had done a far better job than had been expected, and added that, in their opinion, many women would continue after the war in jobs which had been denied to them previously.

These personnel men *did* enumerate several irritating faults shown by some women which would rule them out entirely if other replacements were available. These were: (1) breaking into tears when their work is criticized; (2) expecting the same gallantries from the men in a busy hard-pressed mill as they had received in social life; and (3) lack of a feeling of responsibility for the job, whatever the emergency.

The cute little feminine tricks and the tears which men find so irresistible and adorable in their sweethearts, wives, or daughters, and which so many women from babyhood up have found effective in getting what they wanted, just aren't *cute*—they are only irritating and disgusting in a busy work shop, mill, or laboratory. Women must adjust themselves to the necessities and obligations of the job if they expect to make a go of those jobs. Most girls have been trained to believe that their first concern is their family or personal demands, and to many women their job is only an incidental occupation.

Girls who are really determined to make a place for themselves in the industry have an unprecedented chance to prove themselves fit for the job and to get ready to hold their own in the tough days that are bound to come during the postwar readjustment period. Executives have the responsibility of running the mills at a profit, however small, because no business can continue to exist losing money for too long. There would be no mill, no investment, and no work for all concerned if they were not successful in this aim. Therefore, if women can prove that they are a good, long-term, economic investment in a job, they should be able to obtain and hold the jobs now open to them.

Forests Are Helping America Fight

JOSEPH L. MULLER, Division of Industrial Economy
Bureau of Foreign and Domestic Commerce

▶▶▶ ONLY A FEW hundred years ago a small wooden ship furled her sails in Plymouth Harbor. From the decks of the *Mayflower* one hundred courageous Pilgrims landed on the shores of America. From the forest had been built the ship that delivered them from persecution, and from the forest that lay before them they constructed their life of freedom. The history of this Nation is closely interwoven with the felling of the first tree and the erection of the first log cabin symbolizing the rising of the new-found freedom.

Today, as in the time of the Pilgrims, our forests are helping us in this fight for freedom.

Lumber required simply for the boxes and crates for shipping munitions, food, and other military and essential civilian supplies totals 12 billion board feet. Add to this, wood for cargo trucks, jeeps, aircraft, boats, landing barges, warehouses, bridges, barracks, and a thousand other uses, and the total of lumber consumed reaches 40 billion board feet.

Wood, used in its basic form as lumber, is not the only way in which forests are helping America fight. From the forests are obtained great quantities of pulp, paper, and paper products. Paper to carry the news of the world and expressions of free speech—wood pulp for making explosives—boxes for packing food.

If all pulp, paper, and paper products were suddenly to become nonexistent, the War either would end within a few months or revert to more primitive methods. Production of shells would be seriously curtailed because of lack of sufficient propellent explosives. There would not be suitable means of transmitting complicated data or instructions. There would be no maps. Without blueprints, there could be no new airplanes, tanks, ships or guns built.

Wood in Pulp and Paper Mill Construction

F. W. GOTTSCHALK, Technical Director
American Lumber & Treating Company

▸▸▸ WOOD IS PROBABLY THE MOST versatile of all structural materials. It is and can be used in so many ways that it is impossible to list all of its structural applications.

With all commonly used metals on the strategic list, wood takes on a role of greater importance today than at any other time in recent history. Because wood has been successfully substituted for metal in wartime construction, the availability of lumber for pulp and paper mill buildings and process equipment has become a matter of individual priority to be established by the purchasing agent. Lumber is not entirely restricted to military uses; it can be obtained where the need is in keeping with wartime regulations.

Wood Pipe

Wood stave pipe is being used extensively in pulp and paper mills. Its flexibility, low cost, carrying capacity, and non-corrosive features are all applicable for transporting liquors, pulp, and process water. An example of its metal-saving ability is found today in the military field. Army engineers recently built a 35,000-man cantonment on the West Coast with a wood-pipe water system. According to a report from Beasley and Stoehr, hydraulic engineers of Portland, Oregon, such a wood system saves 9,193,600 pounds of steel. Their study shows a dollar saving of 39½ to 58 per cent, depending upon pipe sizes, while metal saving ranges from 86½ to 91½ per cent.

Among the advantages of wood pipe are: (1) It carries more water, size for size, than other kinds. (2) Its smooth interior surface remains smooth; it does not rust, chip, scale, tuberculate, corrode, or pit. (3) It is not affected by electrolysis. (4) It is flexible and does not expand or contract longitudinally, so no expansion joints are needed. (5) Water in a wood pipe is insulated against sudden temperature changes; it flows at outside temperatures which would burst other pipes. (Even if water does freeze in a wood stave pipe, the pipe will not burst.)

Wood pipe is made in two general types: machine-banded, and continuous-stave. Machine-banded wood pipe is manufactured in random lengths up to 20 feet, 2 to 24 inches inside diameter, spirally wrapped with heavy, galvanized steel wire. Each joint, complete with coupling, is a finished piece of pipe.

In manufacturing, properly seasoned lumber is milled to a pipe stave pattern, the inside and outside faces milled to the concentric circles of the pipe and the edges to the true radial lines, with a small groove on one edge and a corresponding tongue on the opposite edge. The staves are assembled and clamped into position, then spirally wrapped with heavy, galvanized steel wire. (Where chemical conditions demand, the pipe can be banded with other metal or alloys.)

Each joint of pipe is fitted with its necessary couplings at the factory. All that remains to be done on the job is to drive the joints together. Swelling of the wood makes the connections tight; no bolts, gaskets, or packing are needed. Common labor is able to install it in most cases.

Continuous-stave wood pipe is made in sizes from 6 inches to 20 feet inside diameter, and is used principally in sizes larger than 24 inches. It is shipped knocked down, completely manufactured, and ready to assemble. It is fitted with individual steel bands connected with malleable iron pipe shoes. The joints connecting the staves end to end are made either with galvanized steel tongues or malleable iron butt joints.

For long life, wood pipe must be (a) completely and constantly full of water so that the wood cells are saturated, or (b) pressure-treated. Abundant historical data and mill experience substantiate the claim that when wood pipe is kept full it will remain in excellent condition for an indefinite period because wood does not deteriorate when saturated with water.

Alternate wet and dry conditions in pipes operated partially full, encourage decay at the water line, unless the wood is pressure-treated. In pipes that are operated full, but not continuously, decay will occur in all sectors. Such decay in untreated wood stave usually causes trouble long before it is necessary to replace the pipe. In the early stages of decay, bands will have to be tightened frequently to keep the pipe from leaking; it may be necessary later to use caulking between staves and at the joints.

Exhaust Hoods

Asbestos-cement sheet and corrosion-resistant metal are well adapted to use for exhaust hoods over machines. Yet, the engineer who is willing to experiment can save metal and get remarkably good results with wood.

Although the wood hood is not widely used, it is not an untried idea. At the Columbia River Paper Mills, Vancouver, Washington, pressure-treated wood units are now in use which were installed in 1938. Hoods at this mill are sheathed with a clear grade of Douglas fir flooring. They are reported easy to build. They can be designed by the plant engineer; all framing material can be cut-to-length and fabricated from standard sizes at the lumber mill before treatment; and except for the plant carpenter crew, no skilled labor is needed.

Plywood also may be used for hood sheathing. Constructed in removable sections, the plywood hood also provides easy access for repairs. Some of the new bonding agents also possess a measurable preservative effect.

Moisture Content

Any piece of wood, painted or unpainted, will give off or take on moisture from the surrounding atmosphere until the moisture in the wood has come to a balance with that in the atmosphere. Like many other materials, wood shrinks as it loses moisture and swells as it absorbs moisture.

For use in pulp and paper mills, wood must be properly seasoned, manufactured and installed at a moisture content in accord with its service conditions. Wood can be brought to the correct moisture content by either air-seasoning or kiln-drying.

In air-seasoning, natural atmospheric conditions of sunlight, heat, air circulation, and natural humidity, as well as methods of piling, etc., are relied upon to remove excess moisture from wood. Kiln-drying continues to become more common as the fact is accepted that lumber can be kiln-dried with less loss from degrade and

LEFT—Pulp stock line of chemically-treated continuous stave wood pipe. . . . RIGHT—Chemically-treated lumber used for structural framework of chip conveyor.

at a lower cost, all factors considered, than it can be air-seasoned.

Seasoned lumber has less shipping weight—an important consideration today when long hauls for lumber are common—and arrives on the job in proper shape for immediate use. Studies on carload shipments of Douglas fir from Oregon to Chicago show that the moisture change in transit is negligible when the stock is shipped in tight box cars. The average change in moisture content is only 0.2 per cent for kiln-dried boards averaging 8 per cent moisture content.

Where it is not feasible to have the moisture content reduced by a controlled kiln-drying process, careful adherence to recommended air-seasoning practices can be substituted and carried out in the paper mill yard or storage shed.

Keep in mind that piling correctly for air-seasoning must accomplish a number of things. It must provide proper air circulation, it must offer suitable protection from sun and rain, and it must keep the lumber straight and flat while it is drying. If these things are accomplished, the best drying will result, and drying defects, such as blue stain, end and surface checking, and warping, will be kept at a minimum. Seasoning time naturally varies with climate and time of year, and class of stock.

If drying is too rapid, as evidenced by excessive checking, the circulation should be cut down by using thinner stickers, wider piles, or narrower spaces between the pieces; by spacing the piles closer together; or by a combination of these means. If drying is too slow, as evidenced by blue staining, the course should be reversed.

Too often, lumber has been installed without giving consideration to seasoning. Particularly has this been true of roof decks. Purchasers have overlooked the fact that lumber will swell or shrink, depending upon the moisture content of the wood at the time of installation and the moisture in the surrounding atmosphere.

Without a moisture content specification, lumber has many times been delivered to the job and installed green, or, in the case of treated lumber, "wet from the cylinder" (wood immediately after removal from the treating cylinder and before kiln-drying or air-seasoning). Shrinking, warping, and twisting result as the moisture leaves the wood after it is in place. In a roof, these physical actions may crack built-up weatherproofed roofing or loosen expensive insulating material.

Roof Decks

Certain advantages can be claimed for a wood roof when it is considered that the primary function of the roof is to protect the space enclosed from the elements. To do this effectively, it must keep heat out during the summer and keep heat in during the winter. In addition to protection against the elements, the roof must sustain any loads imposed on it. Because it provides a high degree of insulation and combines strength with relatively light weight, wood has found wide use in roof construction. Its efficiency compared with other materials used for roof decking is shown in Table I.

Decay in a wood roof deck ordinarily is brought about by water condensing on the underside of the roof. When interior air cools to the dew point and condensation occurs, saturation of the lower surface of the roof commences, and this is gradually absorbed toward the center. Unless the lumber is treated, fungus growth is then apt to be developed by both moisture and temperature within the piece.

In the event the temperature of the inner surface of the roof is maintained above the dew point at that location, and assuming that the temperature difference between the inside and the outside of the roof has a uniform gradient, decay is then likely to start at points within the roof plank where the temperature is at dew point. The location of a rot zone, therefore, fluctuates according to the exterior and interior temperatures and the location of the dew point.

Rotting may occur at a rapid rate after inception, and may not neces-

TABLE I

This table is taken from the 1941 edition of the American Heating and Ventilating Engineers' Guide. Coefficients are expressed in B.t.u. per hour per sq. ft. per degrees Fahrenheit difference in temperature between the air on the two sides, and are based on an outside wind velocity of 15 mph.

	Without Ceiling (Underside or roof exposed)
1⅝ in. precast cement tile	0.84
2 in. concrete	0.82
4 in. concrete	0.72
6 in. concrete	0.64
25/32 in. wood	0.49
1⅛ wood	0.32
3⅝ wood	0.23
2 in. gypsum fiber concrete on ⅜ in. plaster board	0.40
3 in. gypsum fiber concrete on ⅜ in. plaster board	0.32
Corrugated iron	1.50

sarily constitute a slow deterioration. True conditions may not be realized, because timbers may appear to be sound though actually badly rotted.

These factors, which exist in practically all mills, have favored the development of treated wood roof decks.

To obtain a satisfactory service life, even though treated material is used, it is important that (1) the right grade of lumber be used, (2) the lumber be installed at a moisture content equivalent to the use conditions, and (3) the decking be properly maintained.

Particular attention must be given to lumber for use over the paper machine. Only a clear grade or a grade allowing only tight, sound knots should be used. In yellow pine grades, the Southern Pine Association recommends No. 1 Longleaf Factory or No. 1 Factory Southern Pine.

Douglas fir recommendations call for "C and Better Clear" over the paper machine. One Douglas fir lumber manufacturer comments: "We have sold the paper mill industry millions of feet of treated roofing material and for a period we supplied in No. 1 Common, but found in most instances that this grade did not give satisfaction. The encased knot permitted in No. 1 Common was the main defect. Many of the paper mills on the Pacific Coast are now specifying clear material on the portion of their roofs over paper machines, and specifying Select Merchantable or No. 1 Common on that portion of the roof where a small knot dropping out would cause no damage."

Wood with a moisture content above 23 per cent will not expand as it picks up more moisture. At moisture contents below 23 per cent, wood expands or contracts as it gains or loses moisture. Atmospheric conditions in most mills create moisture contents slightly below 23 per cent.

To avoid excessive shrinkage or expansion, the decking must be installed in the roof at a moisture content approximately equal that created by surrounding atmospheric conditions. This fact calls for realization that very few general lumber grading rules carry moisture content values; and that a moisture content provision should be made in your specifications.

Painting does not prevent decay but it does protect the surface and assist in prolonging the life of the deck. Moisture condensing on the surface of unpainted wood treated with toxic preservative salts has brought complaints of condensate dripping. Such excess salts as may occasionally be left on the surface by treatment can be kept from forming a solution with the condensate if wood is painted with any high grade industrial paint, suitable for the exposure conditions.

Structural weakness resulting from decay increases the possibility of windstorm damage, because roof fastenings do not hold in rotted wood. Decayed wood burns more readily than sound wood; under favorable conditions it will ignite at 290 Fahr. or even lower.

In regard to fire risks, it should be remembered that wood, unlike metals, does not quickly lose strength when exposed to heat; wood weakens, when subject to continuous high temperatures, only through a gradual reduction in its cross-sectional area; wood eliminates the risks due to expansion since its thermal conductivity is 1/200 that of steel and its coefficient of expansion only 1/10 that of steel; the possibility of sudden collapse is remote, for wood is still in condition to act as a support even after its section has been considerably reduced.

TABLE II—Physical Properties

	Douglas Fir	Yellow Pine	Redwood	Cypress
Lb. per cu. ft. (12% moisture content).	34	41	28	32
Tensile str.,* lb. per sq. in. (12% moisture content).	8,100	9,300	6,900	7,200
Compressive str.,* lb. per sq. in. (12% moisture content).	6,450	6,150	4,560	4,740
Thermal conductivity—B.t.u. per sq. ft., in deg. Fahr. hr.	0.77	0.96	0.76	0.83
Hardness	medium	hard	mod. hard	medium

(*) At proportional limit, in static bending, and compression parallel to grain respectively.

Floors

Pulp and paper mill floors and platforms in general must stand up to extremely hard service, including impact blows, reaction with chemicals

LEFT—Wood underpinnings of this screen room have been pressure-treated with preservative chemicals to protect against decay organisms. . . . RIGHT—All wood used in this screen room was treated with preservative chemicals before placing in use.

and alternate wetting and drying. If such severe operating conditions are recognized, the floor can be properly designed for long service life.

When extraordinary conditions of service demand a durable floor to sustain heavy equipment, good engineering practice frequently prescribes the use of wood floors either in plank or laminated construction, or, under the most severe conditions, in the form of end-grain wood blocks.

Plank floors are usually associated with mill-type construction. This type of construction employs heavy wood timbers as beams, girders and columns, and thick planking for floors, instead of wood joists spaced closely together with thin floor planking.

Dressed and matched planks may be used as the finished decks or as a subflooring with a top finish of 25/32-inch hardwood flooring. Most frequently used grades of Southern Yellow Pine include Standard Longleaf Factory and Dense Standard Factory (shortleaf). Equivalent Douglas fir grades are also extensively used.

Where greater strength and longer spans than are economically obtainable with plank flooring are required, laminated floors provide the qualities of strength, stiffness, lightness of weight, and economy. This type usually consists of 2x4's, 2x6's, or 2x8's with wide faces vertical and in contact to form a solid deck, each piece of which is spiked to those previously laid. When Southern Yellow Pine is used for laminated flooring, the grades usually employed include No. 1 Southern Pine, No. 1 Dense Southern Pine, and No. 1 Longleaf grades of dimension. Equivalent grades of Douglas fir with like fiber-stress ratings also are obtainable.

Where high humidity conditions or lack of air movement foster decay, plank and laminated material should be treated, for heartwood requirements are not included in the grades mentioned.

Pine or fir end-grain wood blocks offer an unusually high resistance to wear. This type of flooring is recommended where excessive wear is encountered (as in the machine shop).

Tanks

Traceable lumber requirements for wood tanks in 1940 totaled 45,529,000 board feet, according to the U. S. Forest Products Laboratory. Of the six species widely used, redwood, Douglas fir and cypress furnish five-sixths of the tank stock. Other woods of commercial importance are southern yellow pine, cedar and white oak.

The decay hazards that exist in varying degree where tanks are used are accountable for the small number of species used, for only highly resistant woods, or preservatively-treated woods, can best meet the use requirement.

The use of unsuitable grades is responsible for the failure of many wood tanks built of naturally resistant species. The names of the grades are sometimes misleading, and responsible for part of the trouble. The names causing trouble are No. 1 and Selects.

Consumers sometimes specify these grades, believing that No. 1 means the best, and Selects means that the lumber has been especially selected for tank purposes. Tank manufacturers, of course, know the fallacy of such assumptions, but report that they are often forced to furnish tanks made of these grades because they are specified.

Except where the wood is treated, lumber manufacturers generally have recognized the necessity of all-heart stock. They have established special tank grades, all of which, except the A Tank Stock Grade of redwood, prohibit sapwood. All-heart tank grades have been established in cypress, redwood, western red cedar, and Douglas fir. There are no special tank grades in southern yellow pine, oak and eastern white cedar, now known as Atlantic white cedar. The Bureau of Standards, Department of Commerce, has prepared a commercial standard CS92-41 for cedar, cypress, and redwood. A suitable grade of the principal tank species, cypress, Douglas fir, western red cedar, and redwood, can also be obtained by specifying "tank grade, all-heart," for there is only one grade in each species that meets that specification. There are few, if any, uses for wood for which it is easier to specify the proper grade. The trouble is that users who are not familiar with wood properties specify the lower cost grades containing sapwood without specifying preservative treatment.

The principal advantages of wood are its higher insulating value, its resistance to corrosion, and its low cost. The principal trouble with wood tanks results from warping, swelling, and shrinkage that opens the joints and results in leakage.

Leakage in new tanks is believed by manufacturers to be due most frequently to the use of improperly dried staves. In old tanks, leakage is usually due to the drying out of the staves while the tanks are empty or partially empty. The hoops are tightened to take up the shrinkage, and when the staves are wet they swell under compression, which causes them to set. The repetition of that process eventually makes it impossible to tighten the hoops sufficiently to take up the set. Even comparatively slight decay can cause leakage, for decay on the outer surface of untreated staves allows hoops to sink into the wood when they are tightened.

The life of a tank depends largely upon its foundation. Foundations weakened by decay have, in several instances, condemned otherwise serviceable tanks. Air circulation beneath elevated tanks built on untreated wood foundations will assist in keeping substructure material dry and consequently eliminate one of the requirements for decay-fungus life. Foundation timbers that are subject to termite attack, or timbers that come in con-

TABLE III—Condition of Woods After 31 Days Immersion in Cold Solutions (Examined after 7 days drying)

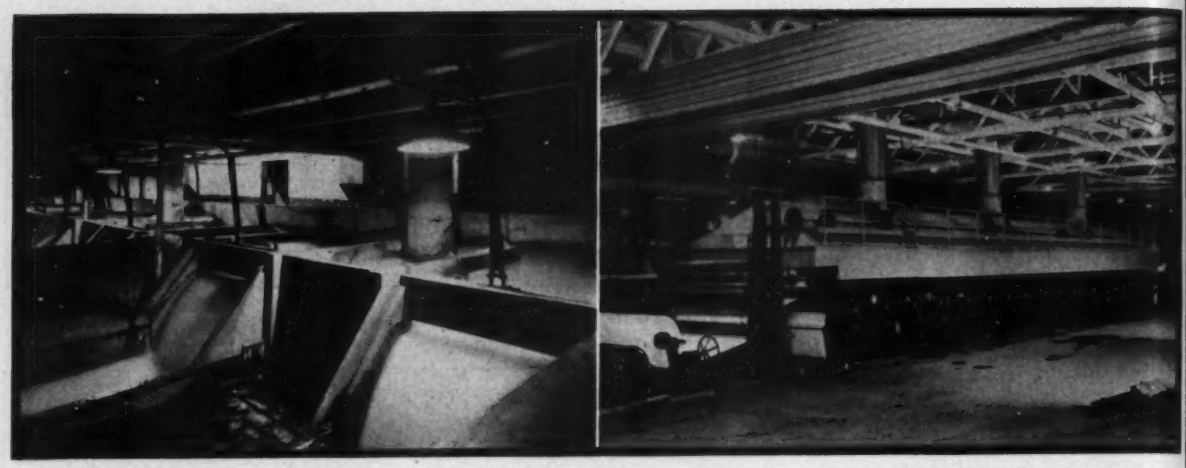
	Douglas Fir	Yellow Pine	Redwood	Cypress
Sulphuric Acid, 1%	NAC	SS	NAC	SS, SB
Sulphuric Acid, 5%	SS	SS	SS, SB	SS, SB
Sulphuric Acid, 10%	S, FSD	S, FSD	S, FSD	S, FSD
Sulphuric Acid, 25%	SSp, FSD	SSp, FSD	SSp, FSD	SSp, FSD
Caustic Soda, 5%	S, NAC	SS, FSD	SSp, FSD	SSp, FSD
Caustic Soda, 10%	S, FSD	SS, SB, FSD	SS, SB, FSD	S, SB, FSD
Alum, 13%	NAC	NAC	NAC	NAC
Water	NAC	NAC	NAC	NAC

TABLE IV—Condition of Woods After 8 Hours Boiling in Solutions (Examined after 7 days drying)

	Douglas Fir	Yellow Pine	Redwood	Cypress
Sulphuric Acid, 4%	SB, GC	SB, GC	SB, GC	SB, GC
Sulphuric Acid, 5%	SS, GC	SB, GC	SB, GC	SB, FSD
Sulphuric Acid, 10%	SS, GC	B, Sp, FD, NG	SB, FSD	B, FD
Caustic Soda, 5%	SS	GC	S, GC	SSp
Alum, 13%	SB, GC	SB, GC	SB, GC	SB, GC
Water	NAC	SB, GC	NAC	NAC

ABBREVIATION KEY

B—Brittle
FD—fiber disintegrated
FSD—fiber slightly disintegrated
GC—good condition
NAC—no apparent change
NG—no good
S—softer
SB—Slightly brittle
Sp—spongy
SS—slightly softer
SSp—slightly spongy



LEFT—Headboxes of treated lumber for handling bleached sulphite fiber. . . . RIGHT—Hood made of pressure-treated wood completely fabricated before shipment.

tact with concrete, should be treated.

An unusual use of wood to adapt old facilities to the production of an improved product is found at the Longview Fibre Company, Longview, Washington. In 1940, when this company switched over to a higher grade product, it became important that scale from two steel tanks 20 ft. x 30 ft. and 30 ft. x 40 ft. respectively, be kept out of the stock. Accordingly, the two tanks were lined with 11,200 board feet of 4 x 8 Douglas fir.

Tables II, III, and IV are useful in determining the suitability of Douglas fir, Southern Yellow Pine, redwood and cypress construction materials for pulp and paper mill tanks and other equipment, from the standpoint of their physical properties and their ability to resist corrosion.

Table III and IV classifying the resistance of four species of woods to various chemical solutions, are based on a report of James K. Stewart, consulting chemist to the Mountain Copper Company, Martinez, California. Tests were conducted on samples 1 x 4 x ¼ inches in size, seasoned and chosen so as to be as nearly as possible in the same physical condition as the woods would be when used for tank and other equipment construction.

Connector Construction

Efficient joining of timbers with metal ring-connectors is closely allied with the use of wood in the structural framework of log haul-ups, chip conveyors, and roof trusses.

Timber connectors have played a big part in making it possible to engineer wood. They accomplish their purpose through decentralization of loads and stresses at joints. A bolt or a series of bolts in ordinary timber framing cause all stresses to centralize on the small areas against which bolts bear. Ring connectors enlarge the bearing areas of such stresses to practically the entire width of the timbers involved.

Because of their centralization or localization of loads, ordinary bolted joints are never as strong as the wood members they join. Because of this, it has been the custom in designing for bolted joints to use members much larger than actually necessary to provide enough wood for safe bolt-bearing purposes at joints. Such designing is expensive and wasteful. For example, a tension splice of 4 in. x 6 in. wood members joined with 12 ½-in. bolts on each side of the joint has a load capacity of 12,600 lb. Compared to this, 10 split-ring connectors used on each side of the same joint create a load capacity of 33,000 lb. Timber connectors now make it possible to utilize 80 per cent to 100 per cent of the working stress capacity of the members instead of 40 per cent to 60 per cent, as formerly, with resulting economical elimination of overdesigning and the use of expensive fittings.

Preservative Treatment

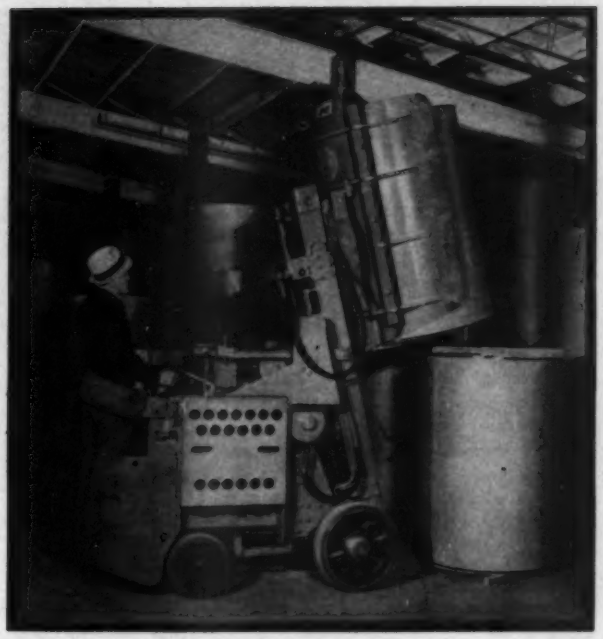
The treated lumber produced today by the wood-preserving industry—an industry that is over 100 years old—owes its uniformity to the observance of rigidly described treating standards. Treatment for protection against decay and termites is usually only of value if carried out in closed cylinders by a pressure process. This assures a deep and uniform penetration and high absorption of toxic chemicals.

The process of impregnation is relatively simple. The lumber or timbers are loaded on specially built tram cars, which are moved into steel pressure retorts varying in size from 6 to 9 feet in diameter and from 65 to 130 feet in length. With the material in the retort and the door bolted and sealed vacuum-tight, the schedule usually begins with preconditioning with live steam, followed by a vacuum which exhausts moisture and air from the wood fibers. This initial vacuum not only facilitates the entrance of the chemical solution but it also largely eliminates any cushioning effect of confined air—which would otherwise force out part of the injected solution when pressure was released. Next, without breaking the vacuum, the solution of preservative chemicals in an exact concentration is forced into the retort and the pressure raised to a predetermined point—often 200 pounds per square inch. This is held for 6 to 24 hours, depending on the material being treated, until the desired penetration and retention have been reached. During this process various gauges, charts, and control apparatus tell the operating engineer exactly what is going on inside the retort, working tanks, pressure pumps, etc., enabling him to adjust pressures and temperatures as may be necessary. Finally the retort is drained, the door opened, and the thoroughly impregnated wood is removed from the retort.

Wood-preserving chemicals fall into two classifications: creosote and toxic dry salts. The pulp and paper industry is almost entirely concerned with the latter. Lumber treated with the various dry salts can be worked, painted and handled with the same ease as untreated lumber. Creosote treatment, which is generally recognized as superior for wood in contact with ground or borer-infested sea-water, is difficult to handle, is readily inflammable, and cannot be painted.

Caution should be exercised in the selection of a preservative agent. With metal fasteners and metal equipment of all kinds used in the mill, it is important that the toxic chemicals be noncorrosive. These chemicals should likewise be non-leachable so that they will not wash-out upon exposure to water.

Maintenance of Battery-Powered Industrial Trucks



F. L. SAHLMANN
Transportation Department
General Electric Company

▸▸▸ THE BATTERY-POWERED industrial truck, possibly because of its ability to operate longer without proper maintenance than most similar equipment, is often neglected to the point where its normal span of usefulness is seriously impaired, before it is finally inspected and overhauled.

Today, such negligence is inexcusable, since during no previous emergency in the country's history have conditions necessitated such rigid maintenance of industrial equipment as now.

Regular inspection and overhauling are the only positive guarantees of the continuous, efficient performance demanded by the 24-hour-a-day, 7-day-a-week production schedules now so common.

The following suggestions, then, are designed to facilitate the care and maintenance of the electrical end of this important piece of equipment:

GENERAL PRECAUTIONS

The batteries, sole source of propulsive energy, should be inspected and serviced at regular intervals, according to the recommendations of the battery manufacturers, and replacements made without delay.

Both the traction motor, which propels the truck, and the hoist motor, which drives the pump on trucks equipped with hydraulically operated hoist and tilt mechanisms, or the gear box on gear or chain drive hoist and tilt mechanisms, should be inspected monthly and overhauled approximately once a year.

The controller, the commutator, the contactor, the accelerating resistor and all allied parts should also be inspected and overhauled at like intervals.

Naturally, local conditions and the skill of the operator will dictate the frequency of inspection and overhauling.

Suggested procedures follow:

Traction Motor—Monthly Inspection

1) Remove dirt from commutator cover and surrounding parts to prevent it from falling into the motor.

2) Remove commutator cover and examine mechanism, noting that copper surface has a smooth polished appearance and is free of copper beads and grease.

3) See that the brush-holder mechanisms seat on brushes and that shunts and terminals are tight.

4) Wipe carbon dust from cables and brush holders.

5) Remove dirt from brushes by lifting springs and raising and lowering brushes in the carbon ways. Do not snap the springs, as this may chip the brushes.

6) Replace short or broken brushes with new ones of the proper grade. If only partial replacement is made, grind new brushes to same length as the other brushes in the motor.

7) Inspect connections for tightness.

8) Examine the interior of motor for charred or broken insulation or other injuries and replace damaged parts.

9) Replace commutator cover.

Traction Motor—Annual Overhauling

1) Remove motor from truck and clean outside of it.

2) Remove commutator cover and raise the brushes from the commutator to avoid damaging them.

3) Remove the nuts from the studs at the pinion end of motor and withdraw the armature complete with commutator-end bearing assembly and pinion end framehead assembly through pinion end.

Important: To obtain maximum life from bearings, they must be kept free of dirt. Therefore, when bearing assemblies are removed from motor, keep them covered.

4) Remove the pinion end framehead assembly and commutator-end bearing assembly from armature, employing suitable puller.

5) Blow out dust and dirt from armature, using clean *dry* compressed air and wipe clean of oil and grease with a cloth saturated with carbon tetrachloride.

6) If armature is found in good condition, proceed as follows:

7) Bake at least twelve hours at 120 C. (250 F.).

8) While hot, paint with a varnish such as Glyptal No. 1201. Paint the string beads but take care to keep the commutator clean.

9) Bake for twelve hours at 120 C. (250 F.).

(*Note*: If it is found necessary to remove armature coils due to grounds, short circuits, or other damage, it is recommended that the complete armature be sent to the nearest service shop for repairs and rewinding.)

10) Take out the cap screws at the commutator end and remove the framehead.

11) Blow out the interior of motor with clean *dry* compressed air and wipe clean of any oil and grease with carbon tetrachloride.

12) If field coils are tight and in good condition, paint them with varnish such as Glyptal No. 1201. Also, paint the interior of the motor with varnish, using care not to get any varnish on the pole-piece faces. Otherwise, remove field coil as follows: Disconnect the cables and remove the cap screws holding field piece to frame. Then slide out the pole and coil through end of frame and slip coil off pole. Keep each pole, coil and any accompanying shims together. Upon reassembly, parts should be returned to their original position, use new lock washers with pole-piece cap screws, make sure that contact surfaces are clean, cables are properly reconnected and cap screws drawn up tightly. Check the coil polarity. Guard against loose connections at all times.

13) Remove dust and dirt from brush holders and cables with carbon tetrachloride.

14) Note that brush-holder mechanisms operate properly; that brushes are free in carbon ways; that shunts and terminals are tight and that carbon ways are not rough or worn. Brushes should never be allowed to wear so short that the pressure arm of the lever rests on the top of the brush-holder carbon way instead of on top of the brush. All brushes must have the same length to obtain an even distribution of current. (*Note*: New brushes may be fitted to the commutator brush holder by placing a strip of fine sandpaper between the end of the brush and the commutator with the rough side of the sandpaper against the brush.)

LEFT—Checking operation of tilt motor clutch. RIGHT—Adjusting brushes while servicing tilt motor.

15) Pole-piece cap screws must be tight and locked with lock washers.

16) Reassemble parts on armature. When replacing bearings, use a suitable brass sleeve so that the pressure will be on the inner race of the bearings.

17) Reassemble armature in frame, putting in new brushes if necessary.

The Commutator

The commutator should never be lubricated since the brushes contain sufficient lubrication. A dirty and greasy commutator will collect carbon dust in the grooves between the segments. This condition will cause a short circuit. The commutator should be kept smooth and concentric with the armature bearings. If the commutator brush surface should become rough, burned, pitted or excessively worn, the armature should be placed in a lathe and the copper turned down just enough to give a true surface. The mica between the copper commutator segments is undercut to 3/64 in. below the copper brush surface on new commutators and should be undercut as often as necessary to prevent the mica from becoming flush with the copper brush surface. Slightly round all sharp edges on the copper segments after turning or undercutting and remove all chips, sharp edges and copper dust from the grooves between the segments. Care must be taken to prevent the copper chips and dust from lodging in the armature winding while reconditioning the commutator, by using a suitable head covering over the end windings.

Assembling tilt motor after servicing.

Pump Motor—Inspection and Overhauling

The same procedure suggested for the inspection and overhauling of the traction motor should be followed in the case of those industrial trucks equipped with a motor-driven gear-and-chain or hydraulically operated hoist and tilt mechanism, except for the differences in the method by which the motor is removed or opened.

Details vary according to the particular type of truck involved, but in general it is necessary to first disconnect the coupling between the motor and the pump. The mounting screws may be differently located, but an inspection will make it readily apparent what changes need to be made in the

routine as already mentioned in connection with the traction motor.

The Controller

1) Blow out all dust and grit with clean *dry* compressed air.

2) If required, oil contact cam rollers through holes provided insulating support and oil reverser-shaft bearing. Use an accepted lubricant in a long snout oil can.

3) Replace any broken springs or shunts and check all connections for cleanliness. Tighten if loose.

4) Inspect contact tips for cleanliness and wear and carefully remove any roughness on contact surfaces with a clean fine file. Contact tips worn halfway through should be replaced.

5) At yearly overhaul period, remove, clean and repack main shaft bearings with an accepted ball-bearing grease.

6) Both the contact tip pressure and the tip gap (distance between the tips when the contactor is open) should be checked periodically.

Contactor

The contactor should be inspected at the same time the controller is inspected, as follows:

1) Use clean *dry* compressed air to blow out all dust and grit, being sure to blow out all metallic dust from contact points.

2) Replace any worn or broken points.

3) If the contact tips are badly burned, dress down with a fine file. (Do not waste contact metal.) Replace tips when worn halfway through.

4) Inspect cable and shunt connections for loose or faulty electrical contact.

5) Periodically check contact tip pressure and tip gap. *Note*: Specific information relative to coil operation and contactor adjustment should be obtained from the manufacturer.

Accelerating Resistor

1) Blow out all dust and dirt with clean *dry* compressed air and check all connections for tightness.

2) Check both resistor ribbon and porcelain insulator for damage or breakage.

From the foregoing, then, it is obvious that proper maintenance of this important piece of industrial equipment, maintenance that will largely eliminate expensive breakdowns and replacements, is based solely on the common-sense, but often disregarded, theory of preventing trouble before it starts.

Brazed Ends Make Wire Rope Safer to Handle

F. L. SPANGLER, M.E.[1]

▸▸▸ WHERE CLIP FASTENINGS or other means of attachment are used that expose the end of a wire rope, there is constant danger that those handling the rope may receive lacerations or puncture wounds from the sharp wires at the rope end. This form of injury is considered by some medical authorities especially dangerous, since it is likely to be deep seated, and the wound might be thought too superficial to require immediate attention. It is not uncommon for blood poisoning to develop from such wounds where immediate treatment is not given. And now that we need every ounce of production energy—this is no time to have workmen laid up because of accidents.

A simple method of eliminating the hazard of sharp, exposed rope ends is to braze the end of the rope with a bronze welding rod, running the bronze back for a distance of an inch or two from the end. When properly done, the bronze covers all the wire ends, and it also has the advantage of holding the rope end intact so that seizings can be removed.

Ends of preformed ropes can be brazed without applying a seizing beforehand, since preforming removes all unbalanced stresses in the rope wires and strands so that all wires hold their position in the rope without the need for using seizings. Even so, a single seizing will insure that the rope construction will not be flattened during the cutting operation. If the rope is not preformed, it is recommended that two or three seizings be applied—one close to the end of the rope, and the others a short distance (4 to 6 inches) apart.

Where end brazing is done, either the same torch or a cutting torch may be used to sever the rope before bronze is applied to the end.

[1]Member: American Society of Safety Engineers.

LEFT—Covering the sharp wires at the rope end by applying bronze with a welding torch. RIGHT—With the end bronze welded, the wire rope can be handled without the hazard of lacerations and puncture wounds caused by exposed wire ends.

Glycerine *Keeps Pace with* Paper Progress

GEORGIA LEFFINGWELL, Ph.D. and MILTON A. LESSER, B.Sc.

▸▸▸ THE AVAILABILITY OF GLYCERINE like certain other materials, is currently curtailed because of importance in the war effort, nevertheless research and investigation on the wider industrial utilization and adaptability of these materials still continues. Indeed, in many instances, wartime research not only indicates newer uses, but reaffirms the indispensability of some of these substances. Some of this newer work is immediately applicable, while other phases must await normal times to find full utilization.

Some of these newer findings are immediately valuable for the war effort; others must be filed away for future reference. Essentially this review will serve to help keep the paper technologist abreast of developments in the use of glycerine in his industry.

It is hardly necessary to review the properties that make glycerine useful in so many phases of paper manufacture and for so many types of paper products. These are quite familiar to paper workers and have been considered in sufficient detail in previous publications. (*1, 2*)

However, the softening (or plasticizing) properties of glycerine have received considerable attention during the past year, and these recent studies have served to reaffirm the value of this quality in paper products. Particularly pertinent is the report of Connor and Nadelmann (*3*) on "The Mechanism of Softening Papers." In a thoroughgoing review of the physics and chemistry of this subject, these authors conclude that glycerine is an excellent paper softener even at low humidity. However, they feel that this softening effect does not seem to result from the hygroscopicity of glycerine, but must be the result of other factors under extremely dry conditions.

In a discussion of nonfibrous raw materials for the paper industry, Poor (*4*) observed that the bulk of plasticizing is being accomplished by the employment of glycerine, invert sugar, and corn sugar or syrup, these materials being used alone or in combination, depending upon the results desired. "Efforts to use other agents," he noted, "have been generally unsuccessful, either for economic reasons or nonperformance of the material." Poor particularly emphasized the high degree of co-operation between the suppliers of these softeners and the paper mills. This has resulted in an ever-increasing use of plasticizers and a greater number of softened papers that have been well received by consumers.

The manufacture of glassine papers is a phase of the paper industry in which the softening properties of glycerine find extensive application. Without the aid of such an agent, the extremely high degree of beating, together with the severe supercalendering under high pressure would result in a very brittle sheet. According to Fries (*5*), flexibility is obtained by treating the paper with a plasticizer at one or two stages before it reaches the supercalender. This authority remarks that many attempts have been made to replace glycerine, but that this problem has not been solved satisfactorily.

Glycerine, of course, finds similar application, and for like reasons, in the manufacture of greaseproof papers, vegetable parchment, and, with ever-increasing frequency, in the production of paper toweling, tissues and kindred products. The recent patent literature presents several instances of such usage. For example, in one quite recent patent (*6*), it is specified that paper suitable for towels and the like be impregnated with glycerine as a softening agent and with a water-insoluble filler, such as magnesium silicate, which is capable of adsorbing and retaining the softening agent in the paper. The proportions used are about 14 to 16 ounces of the filler to about 28 fluid ounces of glycerine.

In a later patented instance (*7*), a softening agent for paper products such as towels or napkins consists of:

	Per cent
Unreacted urea	20
Glycerine	10
Talc	10
Water	60

Glycerine is a standard ingredient of paper sizing compositions, especially those compounded with rosin and similar materials. An example from the patent literature is illustrative. In this case (*8*), use is made of an aqueous sizing dispersion consisting of free rosin soap, a protective colloid and a selected agent, one of which is glycerine. The purpose of glycerine in this composition is to render the dispersion stable to coagulation upon repeated freezings at very low temperatures.

Special coatings and finishes for paper likewise utilize the properties of glycerine. One example, given in the most recent volume of the *Chemical Formulary* (*9*), shows the use of glycerine in zein (prolamine) paper coatings. Typical is the following grease-resisting coating:

	Pounds
Zein	25
Urea	8
Glycerine	5
Alcohol (85%)	100

Particularly important these days are treated papers suitable for use as food containers and the like. In this connection, it should be remembered that glycerine itself frequently serves as a barrier material to oily or greasy substances and to many solvents. Illustrative of such usage is a recent patent (*10*) for making papers suitable for food containers by treating the paper with glycerine and one of several stearates, among them being glyceryl stearate.

Likewise pertinent is another patent (*11*), this one of Australian origin, for making a pest-resisting agent for use on paper products. According to these patent specifications, sheets of paper or cardboard are coated with a solution consisting of:

	Per cent
Formalin	5
Glycerine	5
Ammonium hydroxide	2
Casein	5
Water	83

Several sheets of paper are put together and in between is placed one sheet coated with the above solution, to which is added some blue coloring material. The resulting laminated sheet is then coated on both sides with

another glycerine-containing solution consisting of:

	Per cent
Formalin	10
Glycerine	2
Boric acid	1
Sulphuric acid	1
Water	86

The resulting product is then suitable for manufacture into packing boxes, bags, wrapping materials and related packaging products.

The increasing use of fiber containers, which in themselves frequently require glycerine in their formulation and manufacture, is a most important consideration during these days when metals are finding more important uses. Special treatments for such fiber containers sometimes utilize the special properties of glycerine as is illustrated in a patented composition for fiber containers to prevent sticking of asphalt and similar materials (*12*). In this case, use is made of material such as a clay-like filler 40 parts, sodium tetrapyrophosphate up to 0.5 per cent, a size such as low grade glue up to 2.5 parts, glycerine as a softening agent up to 7.5 parts, a superficial binder of Sterculiaceae gum 1 part, an alkali carbonate as a stabilizer 2.5 parts, and water up to 100 parts.

Similarly, sealing compositions for this type of container utilize glycerine in their formulation. Thus, in one method (*13*), the metal ends of food containers made from one or more layers of fibrous materials are sealed by means of a highly viscous solution containing:

	Per cent
Barytes	10.1
Asbestine	5.0
Karaya gum	0.3
Colloidal clay	1.9
Glue	4.5
Glycerine	2.5
Casein	1.8
Ammonium hydroxide (28%)	0.7
Rubber latex (solids)	2.0
Vulcanized rubber (solids)	5.0
Water	66.2

In the paper laboratory, glycerine still continues to serve an important function as a mountant for the microscopic study of paper (*14*). The recent TAPPI Microscopy Committee report (*15*) mentions Preston's (*16*) paper on using glycerine and liquid India ink as an imbedding medium for section cutting. The India ink, a dispersion of carbon particles, does not stain fibers and has very great opacity.

Undoubtedly one of the most interesting, and potentially one of the most important uses of glycerine in paper is as one of the major constituents of the synthetic alkyd (glyceryl phthalate) resins and ester gums. These glycerine-containing resins have already found extensive application in paper processing and treatments, and new uses are constantly being developed. Sometimes these alkyd resins are used alone in the specialized paper treatments, but more frequently they are used in conjunction with other materials. Thus in one case (*17*), use is made of a waxy substance and an ester gum of glycerine and polymerized resin to make waterproofing compositions suitable for paper and other fibrous materials. In another instance, (*18*), greaseproofing films for paper are made from a base material comprising gelatin or casein, water, ammonia and a partially condensed, soluble phthalate ester formed by heating glycerine and phthalic anhydride under specified conditions.

The distinctive qualities of these various modified alkyd resins have been finding wide utilization in the manufacture of highly specialized paper products. One rather unusual use for one class of alkyd resin is given in a patented procedure for making filter paper (*19*). In this case, the fibers of porous paper stock are loosened and distorted by treatment with an alkali, washed and dried to increase the filtering capacity of the stock. A thin solution of glyptal resin is applied simultaneously and serves both to waterproof the fibers and to cause them to adhere together.

Russian studies (*20*) on methods of preparing water-resistant polishing paper afford other instances of alkyd utilization. Paper, particularly suited for polishing surfaces prior to lacquering, was developed after numerous tests. The best binder for the requisite abrasive was found to be a synthetic resin; such as alkyd, phenol-alkyd or cresol-alkyd resin. Carborundum was the recommended abrasive and an alkyd-base lacquer was selected for the "fixing" substance.

Of marked interest and of increasingly wide application is the employment of water-dispersed special alkyd resins for use in paper treatment (*4*). Alkyd emulsions are now available commercially and are finding extensive use in the impregnation of paper and paperboard. According to Maguire and Rote (*21*), in a report to the 1942 TAPPI meeting, water-soluble alkyds may prove to be of interest as a beater size for special purposes, since they are readily precipitated by acids. These resins can also be incorporated into casein, starch or glue coatings to improve toughness and adhesion.

The patent literature affords instances of the use of such alkyd resinous preparations. In one recent example (*22*), resin emulsions suitable for use in coated papers are prepared from a mixture containing 70-98 per cent of a water-insoluble, drying oil modified alkyd resin together with 30-32 per cent of a rosin-maleic acid resin.

Other glycerine derivatives are finding important application in the production of paper specialties. Thus, in the manufacture of a coated paper bag suitable for holding oil for an extended length of time, use is made of paper associated with a relatively nonvolatile, oil-resistant softener such as polyglycerine. This use of polyglycerine prevents the paper from cracking or creasing during manufacture or use (*23*).

Bibliography

1) Leffingwell, G. & Lesser, M. A.: *Paper Ind.* 20:44, (April) 1938.

2) Leffingwell, G. & Lesser, M. A.: *Tech. Assoc. Papers* 22:169, (June) 1939; also *Paper Tr. J.*, TAPPI Sect., July 13, 1939, p. 17.

3) Connor, C. M. & Nadelmann, A. H.: *Paper Tr. J.*, TAPPI Sect., Sept. 4, 1941, p. 115.

4) Poor, E. N.: *Paper Tr. J.*, TAPPI Sect., April 17, 1941, p. 36.

5) Fries, K. W.: PAPER IND. AND PAPER WORLD, July 1941, p. 352.

6) DeWitt, F.: U. S. Pat. 2,249,118, July 15, 1941.

7) Roth, M. H.: U. S. Pat. 2,268,674, Jan. 6, 1942.

8) Dreshfield, A. C.: U. S. Pat. 2,268,-112, Dec. 30, 1941.

9) Bennett, H.: *The Chemical Formulary* Vol. V, New York, Chemical Publishing Co., 1941, p. 485.

10) Shurley, F.: U. S. Pat. 2,253,655, Aug. 26, 1941.

11) Hillen, C. W.: Australian Pat. 113,-158, May 22, 1941.

12) Rollins, J. H. & Hatch, W. E.: U. S. Pat. 2,238,783, Apr. 15, 1941.

13) Dewey & Almy Chem. Co.: Brit. Pat. 517,037, Jan. 18, 1941.

14) Graff, J. H. & Schlosser, M. A.: *Paper Tr. J.*, TAPPI Sect., Feb. 19, 1942, p. 119.

15) Bentzen, F. W.: *Paper Tr. J.*, TAPPI Sect., Jan. 30, 1941, p. 29.

16) Preston, J. M.: *J. Textile Ind.* 31: No. 8; T206 (Aug.) 1940.

17) Maguire, J. F.: U. S. Pat. 2,261,091, Oct. 28, 1941.

18) Van der Meulen, P. A.: U. S. Pat. 2,211,992, Aug. 20, 1940.

19) Magruder, W. C., Jr. & Korte, A. C.: U. S. Pat. 2,228,320, Jan. 14, 1941.

20) Yakuborich, S. V. & L'vova, E. I.: *J. Applied Chem.* (U. S. S. R.). 14:640, 1941 (through) Chem. Abstr. 36:3583, 1942.

21) Maguire, J. F. & Rote, J. G., Jr.: (through) *Chem. & Met. Eng.* 48:163, 1942.

22) Cheetham, H. C.: U. S. Pat. 2,272,-057, Feb. 3, 1942.

23) Williams, F. E.: U. S. Pat. 2,244,-795, June 10, 1941.

PAPER SKETCHES

DURING ENGLAND'S "BLACK PLAGUE" IN 1636, RAG-COLLECTING WAS BANNED, NECESSITATING THE TEMPORARY CLOSING DOWN OF PAPER MILLS.

THE PAPER OF MANY OF THE DOCUMENTS DATING BETWEEN 768-786 A.D., DUG UP BY ARCHAEOLOGISTS IN EASTERN TURKESTAN, CONTAINED THE RAW FIBERS OF CHINA GRASS, MULBERRY AND LAUREL—ALSO MACERATED FLAY AND HEMP RAGS.

NEARLY

6,000,000 TONS OF VARIOUS KINDS OF WASTE PAPER WERE USED IN 1941 BY U.S. PAPER MILLS IN THE PRODUCTION OF PAPER AND PAPERBOARD. THE TOTAL PAPER AND PAPERBOARD PRODUCTION THAT SAME YEAR AMOUNTED TO 17,304,143 TONS.

IN LATE 17th CENTURY ENGLAND, THE WHITE PAPER MAKERS COMPANY ENJOYED THE SOLE PRIVILEGE OF MAKING PAPER MORE THAN 4 SHILLINGS A REAM IN VALUE.

Turkle

HELP ASSURE VICTORY
Buy War Bonds. Conserve Rubber. Eliminate Unnecessary Travel. Use the Telephone Only When Important. Salvage All Scrap and Waste Material.

"FATIGUE"—*he can take it!*

Whether it be in the armed forces or on the production lines, it takes patience, endurance and determination to do the job that needs to be done.

Our high temperature tubing experts spent thousands of tedious hours experimenting, testing and proving to develop a low alloy steel that would have a life more nearly comparable to that of the high alloy steels and at the same time cost little more than carbon steel.

Timken DM and SICROMO Steels are the result of these experiments. Today they are saving large quantities of critical alloys and giving superior performance in the overloaded oil, chemical and paper industries. The Timken Roller Bearing Company, Canton, Ohio. Steel and Tube Division.

The One Test For Every Decision—Will It Help To Win The War?

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

ALLOY STEELS

A L L I E D

H. K. PORTER CO. OPENS OFFICE IN PHILADELPHIA

To serve more efficiently the increased volume of business in eastern Pennsylvania, western New Jersey, Maryland, and Delaware, the H. K. Porter Company, Inc., of Pittsburgh, Pennsylvania, opened new offices in the Girard Trust Building in Philadelphia on April 1.

Roy B. Rose, an executive of the company's Process Division, has been named district manager for the territory. The company, manufacturers of industrial locomotives and process equipment, reports increased demand in this area for chemical process equipment in particular and for the new line of wood tank equipment, necessitating the new headquarters.

Roy B. Rose

This new office will serve the territory including eastern Pennsylvania, western New Jersey, Maryland, and Delaware.

◆

ADVERTISING AWARD GIVEN TO HERCULES POWDER COMPANY

The Chicago Business Papers Association selected the Hercules Powder Company, Wilmington, Delaware, as winner of the award for the best all around use of business paper advertising in 1942. The award was presented to Theodore Marvin, Hercules advertising manager, at a joint meeting with the Chicago Federated Advertising Club on March 11. Fuller & Smith & Ross, Inc., New York, was the agency for the winning campaign.

In selecting Hercules Powder Company advertising, the jury of awards declared, "For the most outstanding business paper campaign entered in this competition in that it contributed more completely to the dissemination of information of the advertiser's facilities to serve many industries either in the present crisis or after. Space was entirely adequate in each industrial or cross section field. Illustrations and format were of the highest caliber, copy informative to a high degree, and objectives clearly gained."

The competition was established last year by the Chicago publishers as an annual award. Twelve awards of merit also were presented to others among the 122 advertisers who entered the competition.

◆

ACME STEEL ADOPTS NEW TYPE SHIPPING CARTON

A newly developed carton to carry 100 pounds of its carton stitching wire was recently adopted by Acme Steel Company, Chicago. The new shipping case, constructed of double wall corrugated board, is the result of intensive research over a period of several years. This included drum tests and continual shipping under the most difficult conditions.

The container consists of four parts . . . all of which are designed for quick assembly. Tops and bottoms are purchased by Acme in the form of scored blanks which are composed and stitched as needed. Two taped "tubes" form a separator in the center of the carton. This type of separator was chosen since it divides the container contents into smaller units thus eliminating the possibility of exerting the total pressure on any one point within the carton.

To facilitate the removal of the stapling wire by the receiver, a ribbon is placed through the core of the last coil packed in each tube. The containers are sealed and reinforced with two $\frac{3}{8}$" steel straps which are quickly applied to the carton by means of tensioning and sealing tools.

▸▸▸ AS A PART of its postwar planning, The Lincoln Electric Company, Cleveland, Ohio, is announcing a unique savings plan to enable workers to start their own private business after the war.

◆

BERT CREMERS CHARGE OF SALES MICH. ALKALI DIVISION OF WYANDOTTE

The Wyandotte Chemicals Corporation, a new company formed the first of the year, is now fully organized and is operating under its production plans as scheduled.

The new company, it will be recalled, was formed by the consolidation of the Michigan Alkali Company and the J. B. Ford Company, with headquarters at Wyandotte, Michigan. E. M. Ford is president of the Wyandotte Chemicals Corporation; his father, E. L. Ford, who was president of Michigan Alkali Company and the J. B. Ford Company, passed away just 12 days before he would have been made president of the new company. E. M. Ford was formerly vice president and treasurer of the Michigan Alkali Company.

Bert Cremers

The sales departments of both the J. B. Ford Company and the Michigan Alkali Company will maintain their separate identities as divisions of Wyandotte Chemicals Corporation. In charge of sales of the Michigan Alkali Division is Bert Cremers, a vice president of the new company. Mr. Cremers is well known in the paper manufacturing field.

The personnel and resources of the new company, and its part in the war has been splendidly introduced and illustrated in a special edition of its company magazine.

REDUCES PARAFFIN REQUIREMENTS

FOR PA[illegible]GE PROTECTION

METHOCEL

- **Prevents Penetration of Hot Paraffin**
- **Improves Moisture Resistance**
- **Eliminates Undesirable Mottling**

Manufacturers of K-ration Boxes and other moisture-resistant packages find METHOCEL an important aid in reducing penetration of hot paraffin. This results in a substantial saving of paraffin coatings. It also prevents undesirable mottling caused by nonuniform pickup of paraffin and increases moisture resistance of carton. Thus, packages are improved in appearance.

METHOCEL possesses unusual film forming properties—sizings and coatings are extremely tough and flexible. Resistance to heat and "spoilage," and freedom from color, odor and taste, are of great importance to the paper industry.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN
New York, St. Louis, Chicago, Houston, San Francisco, Los Angeles, Seattle

METHOCEL

(DOW METHYLCELLULOSE)

DOW

CHEMICALS INDISPENSABLE
TO INDUSTRY AND VICTORY

HERCULES POWDER OPENS SALES OFFICES IN BOSTON

Sales offices for the Cellulose Products, Naval Stores, Synthetics, Explosives, and Paper Makers Chemical Departments of the Hercules Powder Company were opened on the seventh floor of the Statler Office Building in Boston on April 1.

Heading the various departments in the new offices are Homer C. Simmons, Cellulose Products Department; Howard C. Bates, Synthetics Department; and W. M. Williams, newly-appointed resident manager of the Paper Makers Chemical Department's plant at Stoneham, Massachusetts, who also heads the Industrial Chemical Division sales group of the PMC Department in Boston. G. J. Rising, former resident manager at Stoneham, has been transferred to the Pittsburgh office, representing the Industrial Chemical Division.

Container Corporation of America, Philadelphia—Officials of the Philadelphia plant of this company have just been notified by Undersecretary of the Navy James V. Forrestal that the plant has won the Army-Navy "E"—one of the first in the paperboard and paper box industry to be so honored. Actual presentation ceremony date has not yet been set.

Clark Tructractor Division of Clark Equipment Company, Battle Creek, Michigan—The Army-Navy "E" award was presented to this company by Col. Frank Ross, U.S.A., T.C., at ceremonies held in the W. K. Kellogg Auditorium in Battle Creek on February 19. Attending were 2,551 Clark employees, guests, and engineers from Clark offices in 23 cities. Ezra W. Clark, vice president and general manager, accepted the flag. Lt. Comm. Hugh B. Masters, U.S.C.G.R., Commanding Officer, Coast Guard Training Station, Battle Creek, presented the "E" pins, which were accepted by Howard F. Reed, president of the Clark Employees Association. Edgar A. Guest was master of ceremonies.

De Laval Steam Turbine Company, Trenton, New Jersey—This company has recently been granted a renewal of the Navy "E" award, for a period of six months. The new award carries the right to add a white star to the Navy "E" burgee flown over the plant. Formal presentation ceremonies were held in the De Laval plant.

Foote Bros. Gear and Machine Corporation, Chicago—For meritorious work in its production of equipment vital to winning the War, this company was awarded the "E" honor. The presentation ceremonies were held at the company's plant on Saturday afternoon, March 27, and were broadcast over Station WGN. H. M. Horner, vice president of United Aircraft Corporation, acted as master of ceremonies. The address of welcome and introductions were given by the company's secretary treasurer, James R. Fagan. The Army-Navy "E" pennant was presented to Wm. A. Barr, president of the company, by Rear Admiral C. H. Woodward, U.S.N. (retired), and the company's band and chorus added their part to the festivities. The celebration was concluded with a banquet for company employees on Saturday evening.

Foster Wheeler Corporation, New York City—The Dansville, New York, works of this company was recently presented with the Army-Navy "E" star pennant for continued high production. Rear Admiral Clark H. Woodward, who conferred the original "E" award last August, again presented the new burgee. Ellsworth Easton, president of the company's Employees Association, acknowledged the award. Captain R. G. Scherer, U.S.M.C., presented the token insignias. This is the fourth time within a year that the Navy Department has awarded employees of Foster Wheeler shops for high production.

Shartle Bros. Machine Company, Middletown, Ohio—The Army-Navy "E"—symbol of efficiency in the execution of Government contracts—was presented to this company on April 6. Representatives of the Army and Navy, mill representatives, and other honored guests, as well as the entire Shartle organization and families attended the colorful presentation ceremony.

Whiting Corporation, Harvey, Illinois—This company has just been granted the Army-Navy "E" pennant for outstanding performance in production. Actual presentation ceremonies of the award will be held April 20.

"V" DEPENDS ON ME!

By the use of mirrored posters, Leeds & Northrup Company, Philadelphia, has devised a most unusual method of emphasizing the meaning of its slogan —"V" Depends On Me!

The red, white, and blue posters are displayed on the bulletin boards of the plant, and as one employee after another passes before them, his or her face is reflected in the mirror above the slogan "V" Depends On Me! The mirror attracts, and the true meaning of the slogan registers.

◆

▶▶▶ THE FIRST ISSUE of *The Eastwood Wire*, which is a publication of the Eastwood-Nealley Corporation, Belleville, New Jersey, has just been released. This publication will be distributed to company employees in the plant and in the armed forces. The first issue contains a brief history of the beginning of fourdrinier wires made in the United States with special reference to William Staniar, of Belleville.

◆

▶▶▶ ELGIN SOFTENER CORPORATION, Elgin, Illinois, has appointed as district representatives in the northwest territory the R. E. Chase & Company. Headquarters for R. E. Chase are in Tacoma, Washington, and branch offices in Seattle, Spokane, and Portland. The company will handle both the Elgin industrial and marine line of water conditioning products.

◆

ELECTRONIC SPECIALISTS APPOINTED BY G-E CO.

General Electric Company, Schenectady, New York, has appointed 18 G-E industrial electronic specialists in company offices throughout the country.

These specialists, located in New York City, Philadelphia, Boston, Chicago, Los Angeles, Denver, St. Louis, San Francisco, Detroit, Portland, Dallas, Atlanta, Cleveland, Cincinnati, Pittsburgh, Buffalo, and Newark, will be responsible for all industrial electronic applications in their territories.

The age-old Chinese custom of paying the physician to *keep well* reflects the wisdom of this ancient race. Prevention is far better than cure.

And likewise, in industry, boilers that are protected from breakdown by intelligent and continuous feedwater conditioning will continue to operate at maximum steam output with a minimum of time out for overhaul.

W. H. & L. D. Betz is an organization of engineers and chemists, trained and skilled in the science of boiler feedwater conditioning for the prevention of scale, corrosion, carryover and embrittlement. Our service is complete for all industries, with prescribed treatment specifically recommended for individual requirements.

We have laboratories and engineers located throughout the United States and Canada.

W. H. & L. D. BETZ

FRANKFORD · PHILADELPHIA · PENNA.

CHEMICAL ENGINEERS AND CONSULT

ASSOCIATIONS

HAYWARD ADDRESSES NEW ENGLAND SECTION TAPPI

At a dinner meeting held in the Hotel Roger Smith, Holyoke, Massachusetts, March 19, National TAPPI President Ralph A. Hayward, of Kalamazoo, Michigan, told members of the New England Section that the industry faces its greatest challenge in the coming six months. He said that production of quality papers (the type of paper which most New England mills produce) would be cut 75 per cent, and in order to continue operations, production of papers essential to the war effort must be increased.

Mr. Hayward stated that the industry will have a shortage of 25 per cent in bleached sulphite pulp this year, and urged greater use of rag stock. He said that makers of quality paper must face a profitless period; they must content themselves either with manufacturing a greatly changed product and selling it at cost or simply shutting down.

"Get your laboratories into action," he urged. "Let them find out what paper can be made of other than the various grades of pulp."

In the absence of the president of the section, Norman L. Bearse, of Champion-International Company, William L. Foote, of B. F. Perkins, Inc., presided at the meeting. Prior to the meeting, Mr. Hayward and a group of paper mill executives were guests at a luncheon given by the Hercules Powder Company.

◆

48-HOUR WORK WEEK

A notice directed to all paper and pulp manufacturers has just been given out by E. W. Tinker, executive secretary of the American Paper and Pulp Association. This release gives specific information on the forty-eight hour work week. Mr. Tinker's letter is published herewith:

Under Regulation 3 as first issued in our letter of March 2nd (Labor-War Manpower Commission No. 10), employers who did not find it feasible to lengthen their work week or who considered their present shorter work week as the optimum were not required to report in order to comply with the regulation.

Following is a new instruction issued by the Commission which changes the definition of a complying employer:

"On April 1, every employer in the designated areas and activities who is not excluded under 903.7 and whose establishment is on a work week of less than forty-eight hours is expected either (1) to submit a proposed schedule of release of workers which will be brought about by putting the establishment on a forty-eight hour week within a reasonable length of time, or (2) to submit application for a work week of less than forty-eight hours. An employer who submits either one or the other of the above will be in compliance with regulations, and will await notice of the acceptance or non-acceptance of the proposed schedule of release of workers or of the application for a shorter work week. Any employer who is not on a forty-eight hour week in the designated areas or activities or who has not taken one of the two alternative steps just outlined by April 1 cannot be considered as being in compliance with the regulations."

Therefore, employers in any one of the 32 critical areas should as quickly as possible report to the Area Manpower Directors either one of the following:

I. A proposed schedule of workers to be released by going on a forty-eight hour week, or

II. An application for approval of a workweek of less than forty-eight hours.

Applications will then be considered in compliance with the order.

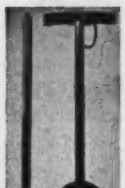
◆

WET-STRENGTH PAPERS DISCUSSED AT DINNER MEETING OF OHIO TAPPI

The Ohio Section of TAPPI held a dinner meeting at the Manchester Hotel, Middletown, Ohio, on March 13. Carl Roess, Wrenn Paper Company, Middletown, chairman of the Section, presided.

Following the dinner, Charles S. Maxwell, of the American Cyanamid and Chemical Company, presented a paper on "Wet-Strength Papers," after which Harold Sinclair and O. M. Cornell, of American Cyanamid, led the discussion of the paper with the audience.

PREVENT REJECTS



With changes in pulp, restrictions of chemicals, and experienced workers being called to the service, the paper manufacturer faces a problem to keep his production up to standard. By insisting upon a constant check and maintenance of proper roll temperatures in the drying chain he can go a long way in preventing spots, cockle, curling and blisters. The Cambridge Pyrometer is the instrument used for checking roll temperatures in many prominent mills.

Write for bulletin 1945.

The Cambridge is made in a hand model and with the extension attachments to reach those hard-to-get-at places.

BUY WAR BONDS

CAMBRIDGE INSTRUMENT CO., INC.
3732 Grand Central Terminal, New York, N.Y.

CAMBRIDGE
SURFACE PYROMETERS

CONVENTIONS AND COMING EVENTS

May 1—Annual Ladies' Night, Michigan Division American Pulp and Paper Mill Superintendents Association, Park American Hotel, Kalamazoo, Michigan.

May 16-19—National Paper Box Manufacturers Association Silver Anniversary Convention. The Drake Hotel, Chicago.

May 22—Joint Convention of Northwestern Division American Pulp and Paper Mill Superintendents Association and Lake States Section of TAPPI, Conway Hotel, Appleton, Wisconsin.

June 15-17—National Convention of the American Pulp and Paper Mill Superintendents Association, Commodore Hotel, New York City.

STATED MEETINGS

Technical Association of the Pulp and Paper Industry.

Delaware Valley Section—First Friday of each month—Engineers' Club, Philadelphia.

Kalamazoo Valley Section—First Thursday of each month—Park American Hotel, Kalamazoo, Mich.

Lake States Section—Second Tuesday of each month—Conway Hotel, Appleton, Wis.

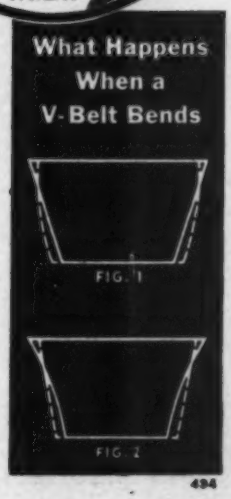
New England Section—Regular meetings of this group have been discontinued. The next meeting will be held in March.

The American Pulp and Paper Mill Superintendents Association, Inc.

Michigan Division—Third Thursday of each month—Park American Hotel Kalamazoo, Mich.

This simple test shows how the Concave Side

Cuts Belt *and* Power Costs!



Have someone bend a V-belt exactly as it bends in going around its pulley. As it bends, grip its sides with your fingers. You will *feel* those sides *change shape*. If the sides were straight before bending, they become *convex* as the belt bends. (See Figure 1 on the right.) Note how the sides *bulge out*.

Now try the same test with a belt which has the patented Concave side. You will feel the *same shape change*—but what a *different result!* The sides do not become *convex*. They become perfectly straight. The bent belt has a shape that exactly fits its sheave groove—as shown in Figure 2.

Two savings result. FIRST:—There is no side-bulge and this means uniform sidewall wear—*longer life!* SECOND:—There is a full side-width grip on the pulley and this carries heavier loads without slippage—saving the belts and also saving your *power!*

Only belts built by Gates are built with the Concave side, which is a Gates patent.

494

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL. 549 West Washington
NEW YORK CITY 215-219 Fourth Avenue
ATLANTA, GA. 738 C. & S. National Bank Building
LOS ANGELES, CAL. 2240 East Washington Boulevard
DENVER, COLO 999 South Broadway
DALLAS, TEXAS 2213 Griffin Street
PORTLAND, ORE. 333 N. W. 5th Avenue
SAN FRANCISCO, CAL. 1090 Bryant Street

SAFETY

SAFETY SCORES

In the annual paper industry safety contest, 12 mills of those participating report perfect scores for February. The mills with a no-accident record are:

Division I—Pulp and Paper Mills

Group A and Group B

(None)

Group C

*Price Brothers & Co., Ltd., Quebec, Can. (Jonquiere mill).

American Writing Paper Corp., Holyoke, Mass. (Riverside No. 2).

Group D

Marathon Paper Mills Co., Ashland, Wis.

Spaulding Fibre Co., Inc., Milton, N. H.

American Writing Paper Corp., Holyoke, Mass. (Mt. Tom Div.).

International Paper Co., Riley, Me. (Riley No. 23).

Alton Box Board Co., Carlyle, Ill.

Division II—Paper and Board (Re-manufacturing)

Marathon Paper Mills Co., Wausau, Wis.

Fort Orange Co., Castleton on Hudson, N. Y. (Paper Box plant).

Thilmany Pulp & Paper Co., Kaukauna, Wis. (Bag mill).

South West Box Co., Sand Springs, Okla.

Bay West Paper Co., Green Bay, Wis.

The paper industry safety contest is conducted among member mills of the Paper and Pulp Section of the National Safety Council, and runs for twelve months. The present contest covers the period July 1, 1942, to June 30, 1943.

* February report missing—covers seven months only.

◆

▶▶▶ SAFETY SHOES are now available to workers who do not have a stamp 17, according to a release by the Office of Price Administration. The order became effective April 5, and it allows any employer having employees who require safety shoes for the protection of their health or safety and whose plant is not served by a Plant Area Board to make application to, and upon approval obtain from, the District Office the number of special shoe stamps necessary to allow the acquisition by his employees of a two months' supply of safety shoes.

◆

SEC'Y OF LABOR MOVES TO CHECK EYE INJURIES

An eye saving section of the National Committee for the Conservation of Manpower in war industries has been established by Frances Perkins, Secretary of Labor, in an effort to check the increasing number of eye injuries to workers in war plants.

Harry Guilbert, of Chicago, director of safety for the Pullman Company, has been named chief of the new section. He will carry directly to management and workers the methods he has utilized in eliminating industrial eye injuries in the Pullman Company.

◆

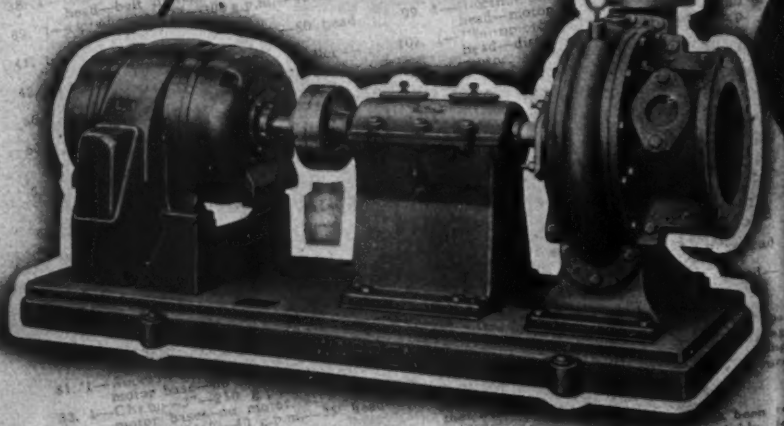
OFF-JOB ACCIDENTS INCREASE ABSENTEEISM

The National Safety Council has analyzed off-the-job accidents as contributing largely to absenteeism. In order to combat this major cause of absenteeism in war industries, the Council has launched an intensive campaign to reduce accidents that are hindering the war effort.

In announcing this campaign, Col. John Stillwell, president of the N.S.C., asserts that off-the-job mishaps are as preventable as work accidents, and that their prevention is just as vital to Victory. He pointed out that work accidents in the United States have been cut 70 per cent in the past 20 years in industrial organizations that have used proved safety techniques.

This campaign will be supported by different types of publications, posters, and sound films.

"glad to dispose of any other pump in the place...except WARREN!"



Not cheerful words these days if you happen to require a pump in a hurry for one of the many important services in your mill. Yet these words, spoken by a well known paper mill executive, and the fact that a second hand Warren Pump is rarely advertised, bear convincing testimony of the high regard in which this equipment is held by discriminating users.

This enviable reputation has been zealously guarded . . . and will continue to be . . . and the old New England craftsmanship which has been an important factor through the years is now contributing its full share to the war effort.

Warren Steam Pump Company, Inc.

WARREN, MASSACHUSETTS

250 Frelinghuysen Avenue Newark

★ ★ ★ PERKINS

THERE IS
NO
SUBSTITUTE
FOR
PERKINS
QUALITY

B. F. PERKINS & SON, Inc.
HOLYOKE, MASS., U.S.A.
THE LARGEST MANUFACTURERS OF ROLLS IN THE WORLD

NAMES *in the* NEWS

Personals

HELEN KIELY HONORED ON 25TH ANNIVERSARY WITH A.W.P. CORP.

In 1918, when World War I was taking young men for the armed forces, a girl graduate from Smith College at Northampton, Massachusetts, became an apprentice chemist in the laboratory of the American Writing Paper Company, Holyoke, Massachusetts. At that time, a woman in a manufacturing company's laboratory was an innovation, but it was a wartime necessity because of the increasing number of young men who were entering the armed forces.

Now, twenty-five years later, many of the nations of the world are engaged in World War II, and the girl chemist at American Writing Paper Company has become one of the leading women industrial chemists in America. She is at present very busy training two young college graduates in her modernized laboratories in the main building of the company, which is now the American Writing Paper Corporation. Miss Kiely told a representative of THE PAPER INDUSTRY AND PAPER WORLD that she is looking for young college girls all of the time; girls who may be trained to fill the inevitable further gaps in the technical personnel of the paper industry.

On the completion of her twenty-fifth anniversary as a chemist with the company, Miss Kiely was honored recently at a testimonial luncheon given for her by the officers of the company at the Hotel Roger Smith in Holyoke. On this occasion, she was presented with a desk set.

During the past year, Miss Kiely has been appointed chairman in charge of education on poison war gases for the Gas Reconnaissance Service, a division of the Civilian Defense program.

A national honor was conferred upon Miss Kiely when she was included in a list of 100 outstanding career women of the country. The list was made up by Mrs. Carrie Chapman Catt and was announced before the Woman's Centennial Congress in New York City, November 26, 1940.

Miss Kiely is a member of the Technical Association of the Pulp and Paper Industry. She has been working for technical control of papermaking since the days when that was left largely to the individual papermaker. Development of this technical control and standardization of grades have been her outstanding contributions to the industry.

L. M. Yoerg, president A.W.P. Corp., and Miss Kiely at testimonial luncheon.

◆

▶▶▶ AT A MEETING OF the board of directors of The Reliance Electric & Engineering Company, Cleveland, Ohio, held recently, S. B. Taylor, works manager of the company since 1931, was elected vice president. Other officers, re-elected by the directors, are, Clarence L. Collens, president; H. Morley Hitchcock, vice president and treasurer; A. M. MacCutcheon, engineering vice president; James W. Corey, sales vice president; C. V. Putnam, secretary; and H. F. Walters, assistant treasurer.

S. B. Taylor

◆

▶▶▶ Former vice president of Allied Paper Mills, Inc., Kalamazoo, Michigan, *James K. Hutchison* has resigned in order to join the organization of Bermingham & Prosser Company as special representative. Mr. Hutchison's headquarters will be in New York City.

◆

JAMES WATSON COMPLETES 50 YEARS WITH LINK-BELT

March 1, 1943, marked the 50th anniversary of James S. Watson's association with Link-Belt Company, Chicago. Mr. Watson is vice president of the company with headquarters at the Ewart plant in Indianapolis.

It was in 1893 that Mr. Watson entered the service of the company, in the order department of the Philadelphia plant of The Link-Belt Engineering Company, as that branch was

Paper's in the Fight And

"Buffalo" PUMPS ... ARE HELPING KEEP IT ON THE GO

• Day in, day out Buffalo Full Ball-Bearing Paper Stock Pumps are hurrying stock to its destination without delay or breakdown. These husky pumps, with specially designed impellers, can't clog—and they take the jolts of sudden consistency changes without complaint. *And all this with top efficiency!* Long after the "Duration" has passed, Buffalo Paper Stock Pumps will be carrying on with traditional dependability and economy.

BUFFALO PUMPS, INC.

213 Mortimer St.
Buffalo, N. Y.

Branch Engineering Offices in Principal Cities.

Canada Pumps Ltd., Kitchener, Ont.

"Buffalo" PAPER STOCK PUMPS

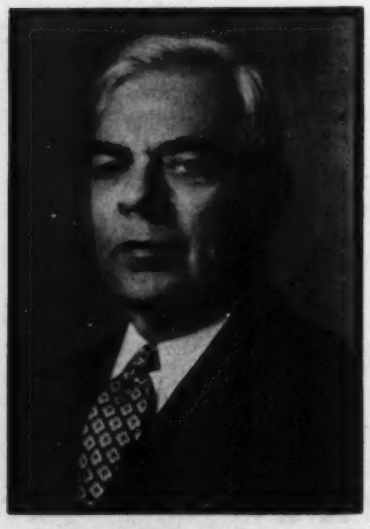
then known. In 1903, after experience in various departments, the management selected Mr. Watson to take charge of the exploitation of Link-Belt silent chain as a positive power transmitting medium. It was at that time new, having been introduced in 1900. In 1921 he was transferred to the Dodge plant in Indianapolis as manager, and in 1929 was elected vice president in full charge of both Indianapolis plants (Dodge and Ewart), in addition to continuing in charge of the sale of the company's broad line of positive drives through its many offices.

Mr. Watson can truly be numbered among Link-Belt's pioneers, especially in the field of positive power transmission, and his dynamic personality has made for him a host of friends through the years.

◆

B. W. ANDERSON NOW A VICE PRESIDENT OF CROCKER, BURBANK, INC.

The many friends of B. W. Anderson, long associated with the sale of Crocker, Burbank papers, will be pleased to learn that he was elected a vice president of the Crocker, Burbank Papers, Inc., Fitchburg, Massachusetts, at the annual meeting of the stockholders and directors. All other officers of the corporation were re-elected. Ralph M. Beckwith is president and treasurer; Norman Harrower, vice president and assistant



B. W. Anderson

treasurer; H. T. Eaton, Arthur L. Bull, and B. W. Anderson, vice presidents.

Mr. Anderson was long associated with paper companies in Chicago. In 1917 he became connected with J. W. Butler Paper Company and was later manager of The Whitaker Paper Company's Chicago branch. His connection with the sale of Crocker, Burbank papers began in 1922, and he has been in Chicago since that time with Clarke & Company and later with its successor, Crocker, Burbank Papers, Inc., as manager of their Chicago office.

◆

▶▶▶ Announcement has recently been made of the appointment of *John L. Collyer,* president of The B. F. Goodrich Company, Akron, Ohio, as a member of the National Industrial Information Committee Governing Board.

◆

JOHN ZIEMANN NOW PRODUCTION MANAGER

The Marinette Paper Company, Marinette, Wisconsin, recently announced the promotion of John V. Ziemann to production manager of the company.

In his new capacity Mr. Ziemann will supervise every phase of the manufacturing processes from pulp making to the finished product. He was formerly general superintendent.

◆

▶▶▶ At the annual meeting of the stockholders of the Southern Advance Bag & Paper Company held recently, *Albert J. Williams,* a partner in the investment banking firm of Boenning & Co., Philadelphia, was elected to the board of directors. The Southern Advance Bag & Paper Company maintains offices in Boston and Chicago.

◆

▶▶▶ Succeeding J. D. Wood, resigned, *Roy M. Smith* has been appointed chief engineer of Roller-Smith Company, Bethlehem, Pennsylvania. Mr. Smith joined Roller-Smith in August, 1942, as assistant chief engineer. Prior to this he was engineering manager for the Wiring Device Division of the Bryant Electric Company.

◆

▶▶▶ At the request of the Containers Division of WPB, *Ermin P. Ruf,* president of the Wayne Paper Box & Printing Corporation, Fort Wayne, Indiana, has ben appointed by the National Folding Box Association to represent the industry in Washington, D. C., as a dollar-a-year man. His duties will be to assist both the War Production Board and the folding and setup paper container industry to regulate further the consumption of paper container board. During Mr. Ruf's absence, A. G. Burry, former president of the Wayne company, will assume management of the business, assisted by Ralph Burry, vice president and treasurer of the company.

GILBERT STEVENS IS NOW TECH. ASST. TO PRESIDENT OF M & O

The appointment of Gilbert Stevens as technical assistant to the president of the Minnesota and Ontario Paper Company, Minneapolis, Minnesota, has just been announced.

Mr. Stevens has been engaged in production, research, and technical

Gilbert Stevens

sales with the company for three years prior to last November. His work has dealt principally with the development of improvements in manufacturing methods of present grades of paper and research on new development in paper coating. For the past several months, he has served in the Navy Department Bureau of Supplies and Accounts, working on technical specifications in paper purchases for the Navy in Washington, D. C.

Mr. Stevens came to the company from the Kimberly-Clark Corporation, Neenah, Wisconsin, where he was in the sales and production department. Prior to that, he was connected with the Appleton Coated Paper Company of Appleton, Wisconsin.

Mr. Stevens' two brothers are also active in the paper business: John Stevens, Jr., is vice president of the Marathon Paper Mills Company at Rothschild, Wisconsin, and Henry W. Stevens is sales manager of Ben C. Betner, Devon, Pennsylvania.

◆

▶▶▶ After serving the Fitchburg Paper Company, Fitchburg, Massachusetts, for the past four years as director of personnel, *Paul Z. Cummins* has resigned to take a position as industrial engineer with the L. C. Smith Company, of Syracuse, New York. Formerly manufacturers of typewriters, the company is now engaged in war work.

QUALITY COUNTS ~ Now More Than Ever

Quality in valves has always been synonymous with the name "Lunkenheimer" and through the years Lunkenheimer Quality has been the standard by which good valves are judged. Constant improvement and refinement have kept Lunkenheimer abreast of ever-changing conditions and requirements.

When unprecedented demands arose to produce essential war equipment for the Army, Navy, Maritime Commission and Air Force, Lunkenheimer facilities naturally were called upon to provide necessary valves, boiler mountings, lubricating devices and aircraft fittings. And now, with the entire productive capacity devoted to war work, less important requirements must be deferred.

However, when post-war conditions come, Lunkenheimer will be ready to meet the demands of constantly changing processes for advanced designs of improved quality for every industrial need.

The complete facilities of Lunkenheimer distributors are at your service. They'll go all out to help you get the things you need. Ask for Catalog 78.

125 lb. S.P. Bronze Gate
Single Wedge Disc
Non-Rising Stem

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO
BOSTON PHILADELPHIA
EXPORT DEPT. 318-322 HUDSON ST., NEW YORK

125 lb. S.P. Bronze Gate
Double Wedge Disc
Rising Stem

150 lb. S.P. Bronze Gate
Double Wedge Disc
Rising Stem

300 lb. S.P. Bronze Gate
Single Wedge Disc
Non-Rising Stem

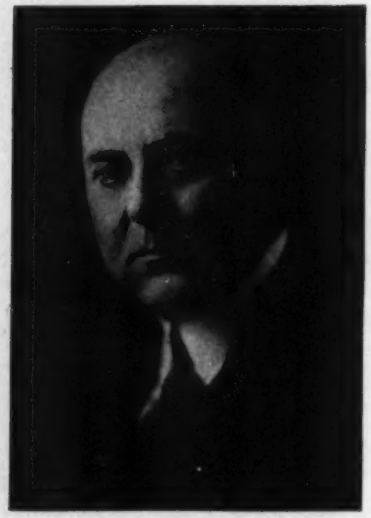
300 lb. S.P. Bronze Gate
Single Wedge Disc
Non-Rising Stem

1000 lb. W.O.G. Bronze Gate
Single Wedge Disc
Non-Rising Stem

BRONZE, IRON, STEEL AND CORROSION RESISTANT ALLOY VALVES, 125 TO 2500 LB. S.P.;
BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS

GEORGE DENT CRABBS MARKS 50 YEARS WITH PHILIP CAREY COMPANY

The many business associates and friends of George Dent Crabbs, former president and now chairman of the board of The Philip Carey Manufacturing Company, Cincinnati, Ohio, recently held a testimonial dinner in his honor celebrating the completion of his 50th year of service with the company.



George Dent Crabbs

Mr. Crabbs joined the Carey company in 1893 as assistant bookkeeper, shipping clerk, and biller. He advanced rapidly, and at the death of Philip Carey, he was made president of the company. He served in that capacity for many years until his recent election as chairman of the board.

A nationally known industrialist, Mr. Crabbs has also been closely identified with Cincinnati's civic progress. Much of the credit for the building of Cincinnati's Union Depot and the completion of the railroad terminals is due to his untiring efforts. He also served for many years as a member of the Federal Reserve Board of Cleveland, and was recently appointed regional chairman for the Fourth Federal Reserve District (Cleveland) of the Committee for Economic Development, which is working toward high levels of employment and productivity in the postwar period.

◆

▶▶▶ For exceptional service to the electrical industry and his company in wartime, *Andrew H. Phelps,* vice president in charge of purchases and traffic for the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania, recently received the Westinghouse Order of Merit. George H. Bucher, president of Westinghouse, presented the Order of Merit medal, a silver W on a bronze background, to Mr. Phelps during a ceremony held at the East Pittsburgh Works. This award was established in 1935 to give recognition to employees who make outstanding contributions to the electrical industry.

◆

▶▶▶ *Joseph C. Doty* has resigned from his connection with the Howard Allied Paper Mills. He has been with the company for sixteen years, the first seven with the Maxwell Division at Franklin, Ohio, and the past nine with the Aetna Division, at Dayton, Ohio, as assistant manager and manager. Mr. Doty will be at his home in Miamisburg, Ohio, while considering several offers for a new connection.

◆

LIEUTENANT MOREHOUSE ON LEAVE FROM NOPCO

Walter B. Morehouse, manager of the Paper Specialties Division of National Oil Products Company, Harrison, New Jersey, has been granted a leave of absence from his duties to report for active duty as Lieutenant (j.g.) of American Volunteer Training, U. S. Naval Reserve. Now holding a private pilot's license, he will be given training as a flying instructor.

Lieutenant Morehouse has been active in the paper industry since his graduation in 1934 from the Pulp and Paper branch of New York State College of Forestry at Syracuse, New York. Before his affiliation with NOPCO, he was chief chemist of Container Corporation in Philadelphia.

Lt. W. B. Morehouse

An article entitled, "Scouring Cylinder Machine Felts," which appeared in the December, 1942, issue of this magazine, was prepared by L. E. Rossiter and Lieutenant Morehouse.

M AND O'S CURTIS NANCE HAS BEEN MADE COLONEL

Assistant to the vice president of Minnesota and Ontario Paper Company, Minneapolis, Minnesota, Curtis H. Nance has been appointed a Colonel in the United States Army and will leave shortly to take up his new duties with the armed forces. Colonel Nance was brought to Minneapolis from Europe in 1940 to develop export sales of American-made Insulite when the War interrupted flow of materials from the firm's Insulite mill at Kymi, Finland. For the past 18 months, he has been in charge of government contracts for various M and O companies in the United States and Canada.

Col. Curtis H. Nance

A West Point graduate, Colonel Nance served nine years in the field artillery, including 22 months with the A. E. F. in France during World War I. He resigned from the regular Army in 1920 to enter business.

◆

▶▶▶ Formerly with the American Viscose Corporation, *C. Vernon Holmberg* has accepted a position in the research laboratory of the Crossett Lumber Company, Crossett, Arkansas. Mr. Holmberg is a TAPPI fellow from New York State College of Forestry, Syracuse, New York.

◆

▶▶▶ Temporary leave of absence has been granted by the New York & Pennsylvania Company, New York, to *Marshal M. H. Dana,* member of the company's sales organization and director of advertising, in order to permit him to join the armed forces. Mr. Dana is now undergoing basic training preparatory to attending officers' training school for serv-

ice with the U. S. Navy. Mr. Dana has represented the company in the New York sales territory and has in addition supervised the company's advertising program.

◆

▶▶▶ Succeeding the late Henry J. Bowerfind, *Wendell C. Laycock*, president of the Fort Wayne National Bank, has been named to the board of directors of the Fort Wayne Corrugated Paper Company, Fort Wayne, Indiana. All officers of the company were re-elected at the annual meeting.

◆

▶▶▶ Vice chairman of the War Production Board and president of S K F Industries, Inc., Philadelphia, *William Loren Batt* has been awarded the Bok Award—a medal and a $10,000 check—not only for his service to the nation in leading industrial mobilization of the War, but as a citizen who performed the most distinguished service for Philadelphia in 1942. This award is the twenty-first since its inception by the late Edward W. Bok in 1921.

◆

▶▶▶ At a meeting of the Kalamazoo Valley Association of Purchasing Agents held at the Columbia Hotel in Kalamazoo, Michigan, recently, *Dallas Bachelder*, of the Sutherland Paper Company, Kalamazoo, led a discussion of commodities, their availability, and prices.

◆

▶▶▶ Formerly with the Detroit Waxed Paper Company, Detroit, *John A. Wesley* has become sales manager of the Kieffer Paper Mills, Ewing, Indiana. In addition to his sales duties, Mr. Wesley will assist Mr. Kieffer, general manager of the company. Before his connection with the Detroit Waxed Paper Company, he was for a number of years sales manager for the Rhinelander Paper Company, Rhinelander, Wisconsin.

◆

▶▶▶ Publicity for the recently organized National Victory Garden Institute, Inc., will be handled by *Edward F. Korbel* and *Worth Colwell*, counsellors in public relations, New York City.

◆

▶▶▶ *George R. Atkins* has been appointed manager of The Bristol Company's branch sales office and factory in Akron, Ohio. Mr. Atkins joined The Bristol Company sales organization in 1929, starting work in the New York office. In 1935 he joined the Pittsburgh District sales engineering staff, and in 1936, he was made resident sales engineer in Greenville,

"When my ship comes in"

is a very old saying in New England. There, many a young adventurer made tidy sums in spite of hazardous ocean risks.

Their ship's timbers were sawed by hand from curved tree trunks and limbs of sturdy oak, to sail the seven seas.

Today New England's shipyards are booming again, but with the clang of steel upon steel. Although we have gone modern in materials and technique, we still put the good old New England conscience into our work.

The traditional evidence of fine workmanship still characterizes **DRAPER FELTS** — try one soon!

Draper Felts Favor Efficiency

DRAPER BROTHERS COMPANY

Woolen Manufacturers Since 1856

CANTON, MASS.

OUR REPRESENTATIVES *to serve you*

L. H. BREYFOGLE, Kalamazoo, Mich.
C. K. BEECHER, Delaware, Ohio
W. L. CAMPBELL, Savannah, Ga.
E.R. LELOFF, Vancouver, Wash.
RALPH E. BRIGGS, Canton, Mass.

South Carolina. Mr. Atkins returned to the Pittsburgh District a short time before taking over his duties as manager in Akron.

◆

▶▶▶ The Quarter-Century Club of the Paper Manufacturers Company, Philadelphia, has sixteen members. As an employee reaches his twenty-fifth year with the company, he or she automatically becomes a member of the club. *Miss Nellie M. Glynn,* secretary, and *Frank W. Coar,* treasurer, have been with the company for 38 and 35 years respectively. Other service records among club members range from 34 to 25 years.

◆

UNION BAG APPOINTS KIRK SUTLIVE DIRECTOR OF PUBLIC RELATIONS

Kirk Sutlive has resigned his position as junior deputy administrator of the War Savings staff for Georgia to join the Public Relations Department of the Union Bag & Paper Corporation at Savannah, Georgia.

Mr. Sutlive resigned as of March 1, after having served as junior deputy administrator for several months.

◆

▶▶▶ *Howard M. Lester* was elected vice president in charge of converted papers of the Fitchburg Paper Company, Fitchburg, Massachusetts, on March 15, at a meeting of the board of directors. Mr. Lester will maintain his headquarters at the Decotone Division of the company in Fitchburg.

◆

R. K. KULP DIRECTOR OF JESSOP STEEL RESEARCH

The Jessop Steel Company, Washington, Pennsylvania, announces the appointment of Robert K. Kulp as director of research. Mr. Kulp was formerly associated with the Steel and Tube Division of Timken Roller Bearing Company as research metallurgist. Previous to that, he was with the Lukens Steel Company in the same capacity.

Mr. Kulp received his B.S. degree from the University of Pittsburgh, his M.S. from Harvard. He also did graduate work at M.I.T. and Lehigh University. He is a member of the American Society of Metals and the American Foundrymen's Association.

◆

▶▶▶ Having been granted a leave of absence from his duties as resident engineer for the Puget Sound Pulp and Timber Company in Bellingham, Washington, *Harold D. Cavin,* commissioned Lieutenant Commander in the Civil Engineering Corps U.S.N.R., will report to the Naval Officers Training Camp Peary, Williamsburg, Va.

Necrology

MAX W. BABB

Max W. Babb, chairman of the board of the Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, passed away on March 13. He had been the company's president for the ten years prior to becoming board chairman in January, 1942.

Mr. Babb received his law degree from the University of Michigan in 1897, after which he practiced law in Iowa until 1904, when he joined the Allis-Chalmers organization as the company's attorney. In 1913 he was made vice president and general attorney, and was closely associated with the late General Otto H. Falk in the management of the concern which underwent tremendous expansion during and after the World War. He succeeded General Falk as president in 1932 when Falk became chairman of the board.

Mr. Babb was 68 years of age at the time of his passing.

◆

HERBERT H. HOFFMAN

Herbert H. Hoffman, vice president and treasurer of The Aetna Paper Company, and secretary of The Maxwell Paper Company, passed away at his home in Cincinnati, Ohio, February 25.

Mr. Hoffman had been with The Aetna Paper Company since 1912, and with the Maxwell Paper Company since its organization in 1927. He was also an executive of The Dayton Envelope Company.

His widow and three children survive.

◆

JOHN B. TODD

John B. Todd, woods superintendent for the Gould Paper Company, Lyons Falls, New York for many years, passed away March 13. He had been associated with the company for nearly 40 years.

A well-known Adirondack lumberman, Mr. Todd was born in Middletown. He entered the lumber business in Lyons Falls in 1884, and later was connected with the Lyons-Fisher estate in the lumber activities.

Mr. Todd was 77 years old. His widow, four sons, and one daughter survive.

◆

▶▶▶ One of the country's old-school industrialists, *J. W. Gardner,* passed away recently. He had been associated with the Gardner-Denver Company, of Quincy, Illinois, from 1881 until several years ago when ill health forced him to withdraw from active participation in business. He was a student of Illinois College in 1881 when he became a permanent employee in his father's company—the Gardner Governor Company, founded in 1859. In 1883, the plant in Quincy was erected, and after preliminary training in the various departments of the company, Mr. Gardner assumed active management in 1905. He was 80 years old.

◆

▶▶▶ Director of the International Pulp Company, New York City, *William Clarke Geer* passed away at his winter home at Hobe Sound, Florida, March 15. Mr. Geer was president of the Albia Box and Paper Company of Troy, New York, for many years, having sold the business about a year ago. He was 83 years old. Surviving are his widow and a daughter.

◆

ROY D. BALDWIN

Following a long illness, Roy D. Baldwin, director and advertising manager of Simonds Saw and Steel Company, Fitchburg, Massachusetts, passed away on February 18.

Mr. Baldwin had been advertising manager for the company for the past thirty-five years. Prior to that, he was connected with the advertising work of the company, then the Simonds Manufacturing Company, in Chicago. Mr. Baldwin was prominent in the work of several national associations including the National Industrial Advertising Association.

◆

JOHN J. VAUGHN

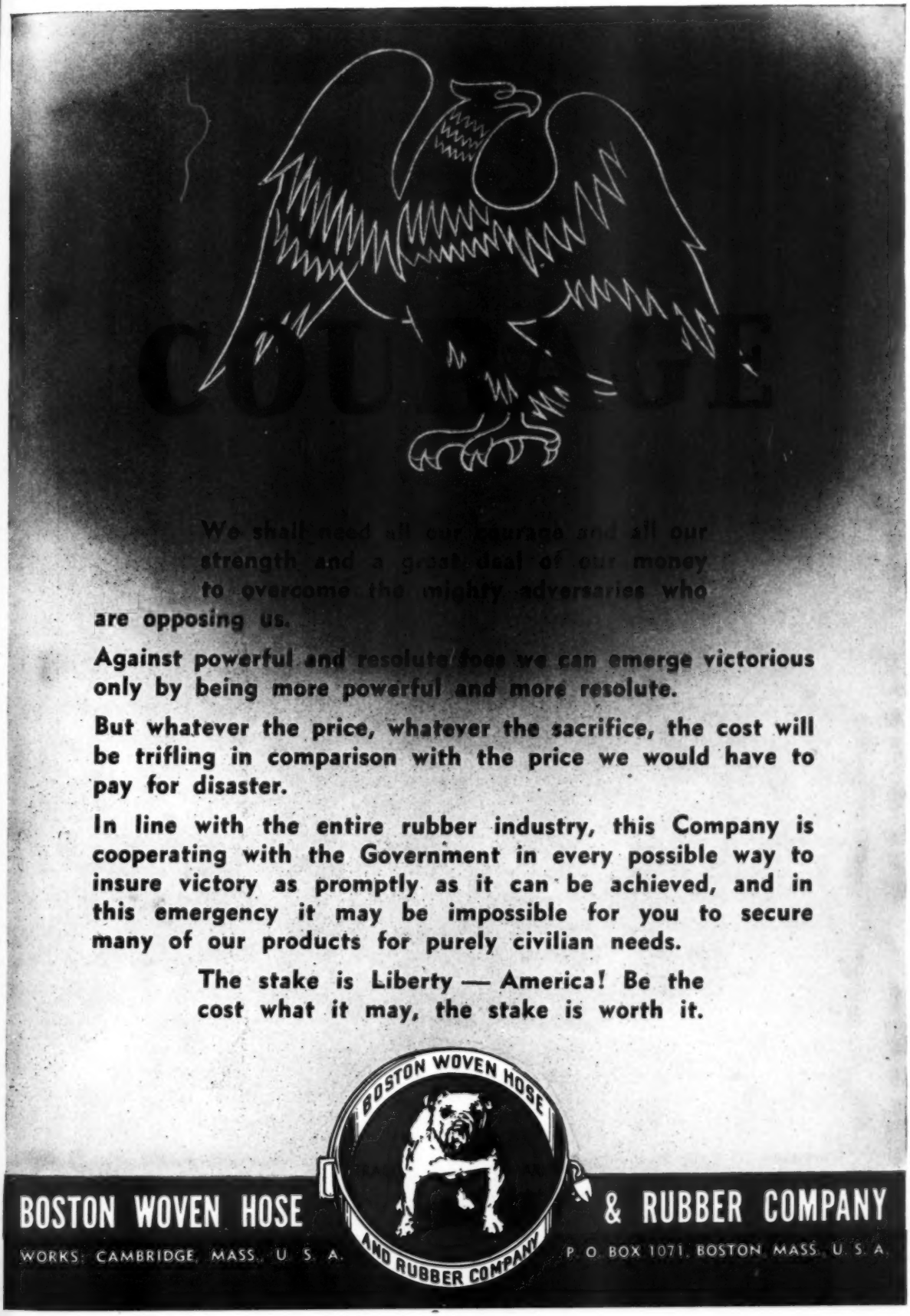
John J. Vaughn, vice president of The Norwood Engineering Company, Florence, Massachusetts, passed away March 19.

Mr. Vaughn had been with Norwood since 1906, when he started as a blueprint boy, and subsequently worked up to assistant draftsman, draftsman, chief draftsman, and finally vice president and head of the filtration department. He had done considerable mechanical and architectural designing in the water filtration.

Mr. Vaughn was 56 years old. His widow, a son, and two daughters survive.

◆

▶▶▶ Secretary of The Bauer Brothers Company, Springfield, Ohio, *W. E. Copenhaver* passed away recently. He was born in 1865 in Baltimore, Maryland. In 1895 he became associated as superintendent of manufacture with the former Foos Manufacturing Company, now The Bauer Brothers Company, thus his passing terminates a connection of 48 years. Surviving Mr. Copenhaver are two sons and two daughters.



We shall need all our courage and all our strength and a great deal of our money to overcome the mighty adversaries who are opposing us.

Against powerful and resolute foes we can emerge victorious only by being more powerful and more resolute.

But whatever the price, whatever the sacrifice, the cost will be trifling in comparison with the price we would have to pay for disaster.

In line with the entire rubber industry, this Company is cooperating with the Government in every possible way to insure victory as promptly as it can be achieved, and in this emergency it may be impossible for you to secure many of our products for purely civilian needs.

The stake is Liberty — America! Be the cost what it may, the stake is worth it.

BOSTON WOVEN HOSE & RUBBER COMPANY

WORKS: CAMBRIDGE, MASS., U. S. A. P. O. BOX 1071, BOSTON, MASS., U. S. A.

Flow Properties of Coating Clays at High Rates of Shear*

KENNETH A. ARNOLD, Chemical Engineer
Brown Company

The characteristics of a coating clay now known to be of importance are its water-binding capacity (its ability to adsorb water on the surfaces), its base-exchange properties, and its particle-size distribution. The different clay mineral species are composed of aluminum silicates of various rations of alumina to silica, with varying amounts of structural water. Differences in structure result in distinctive colloidal characteristics, particularly with regard to base-exchange behavior and reversible hydration.

The hydration of clay has become of critical importance in the high-speed coating operation, and the more exacting requirements of roll coating have necessitated, therefore, a further study of clay characteristics.

Thus far, it has been apparent that a viscosity measurement either on the clay-water mixture or on the completed color, using any standard type of viscometer with a fixed rate of shear, has relatively inadequate significance as an index of the coating characteristics of the color. The usual viscosity measurements are inadequate because of peculiar flow properties which deviate strongly from Newtonian flow.

Therefore, a new testing technique must be developed to determine the flow properties of clay slips or colors at a rate of shear comparable with that attained in the modern roll-coating machine, so as to predict in advance the behavior of the color in and following the coating nip.

In this investigation, an attempt was made to evaluate the flow characteristics of certain clays under high solids content and with percentages of dispersing agent comparable to those used commercially, and to determine the importance of these factors at relatively high rates of sheer.

The testing device consists of an inclined glass plate, down which a smooth steel cylinder is allowed to roll. The essential parts of the instrument are shown in Figure 1. A piece of ¼ inch plate glass, 6 x 1 foot, is placed on a planed 2 inch plank which, in turn, is supported by a table. One end of the table is adjustable so that it may be raised or lowered to produce any desired angle of inclination of the glass plate. The roll is shown at the right of the picture, after having passed over the clay sample. This is a 16 pound solid steel roll, with a ground and polished surface. The roll is 10 cm. long and 11.1 cm. in diameter, and is dynamically balanced to insure uniform acceleration down the inclined plane. A sliding wooden stop, which is used in conjunction with the centimeter scale to define the speed of the roll, also sets the course of the roll. The speed of

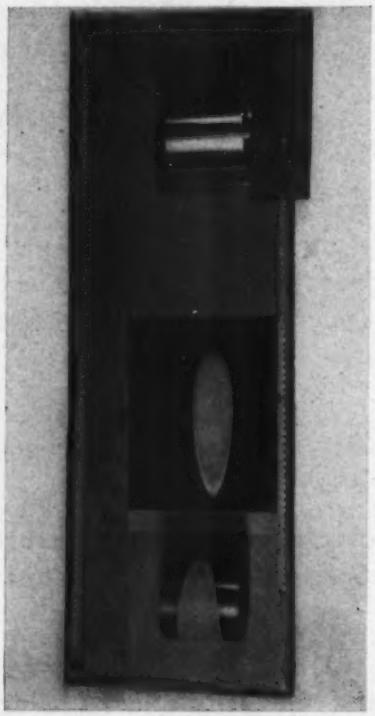


Figure 1

the roll can be varied over a wide range by changing the inclination of the plate; small variations are made by starting at different positions up the incline.

In measuring the flow properties of clay slips or other fluids of high viscosity, a complete line of contact must be maintained between the roll and glass plate. To observe the flow of a liquid, a measured volume is placed on the glass plate over a chosen point, and the roll is released from its starting position at a given distance up the incline. As the roll passes over the droplet of fluid, the latter is rolled out into a symmetrical pattern, as shown by the pattern of clay on the plate in Figure 1.

The volume of fluid applied was measured accurately with a 1.5 cc. hypodermic syringe, graduated both in cc. and in minims. A convenient volume for application was found to be 2 minims (0.1232 cc.) and this amount was used for the tests in this investigation.

The area of the fluid pattern is measured by tracing the outline on glassine paper and following the tracing with a planimeter. It was decided to use the curves of film thickness vs. roll speed to indicate the flow properties of the slips as compared with the flow of Newtonian liquids in the given range of shear. This thickness is calculated by dividing the volume of the fluid (0.1232 cc. in all cases) by the area of the pattern obtained. If the quotient is multiplied by 10^4, the film thickness is expressed in microns.

The advantages of this instrument for the measurement of the flow properties of clay slips are that it stimulates the actual coating nip, produces a high rate of shear, and does not disturb the fluid prior to the measurement. It was found to be extremely sensitive in revealing small differences in the composition and previous mechanical treatment of the clay slips.

Because no measurements of fluid viscosities at comparable rates of shear are available, an exact calibration of this instrument is impossible. Therefore, the most logical approach seems to be a comparison of the flow behavior of clay suspensions as measured by the instrument with that of Newtonian fluids of similar viscosity. A series of castor oils and a 95 per cent glycerol solution were measured for various speeds of the roll. The viscosity of each oil was measured in an Ostwald viscometer at 23 C. Assuming that the viscosity of these Newtonian fluids is independent of the rate of shear up to that produced in the nip, these lines indicate that the film thickness as measured by this technique is directly dependent upon the viscosity of the fluid.

The next problem was to determine the behavior of a dilatant fluid when subjected to a high shear. A 74 per cent slip of commercial coating clay was found to be very dilatant, as indicated by its strong resistance to flow when stirred rapidly and its extreme fluidity when stirred slowly. The slope of the film thickness-speed curve for this dilatant slip is much greater than that for the Newtonian liquids. The reason for this greater slope is evident; the greater the impact of the roll on the clay droplet, the greater is the flow resistance of the clay. This stiffening is reflected in an abnormal increase in film thickness with increasing shear.

Thixotropy might be considered the opposite of dilatancy, if it were not for the time factor involved in the former. There is a gradual build-up of structure with time in thixotropic systems, whereas the transformation is instantaneous for dilatant systems. In this work, it was found that thixotropic structure was destroyed in

(*) A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., 1942. This work was carried out under the direction of B. W. Rowland.

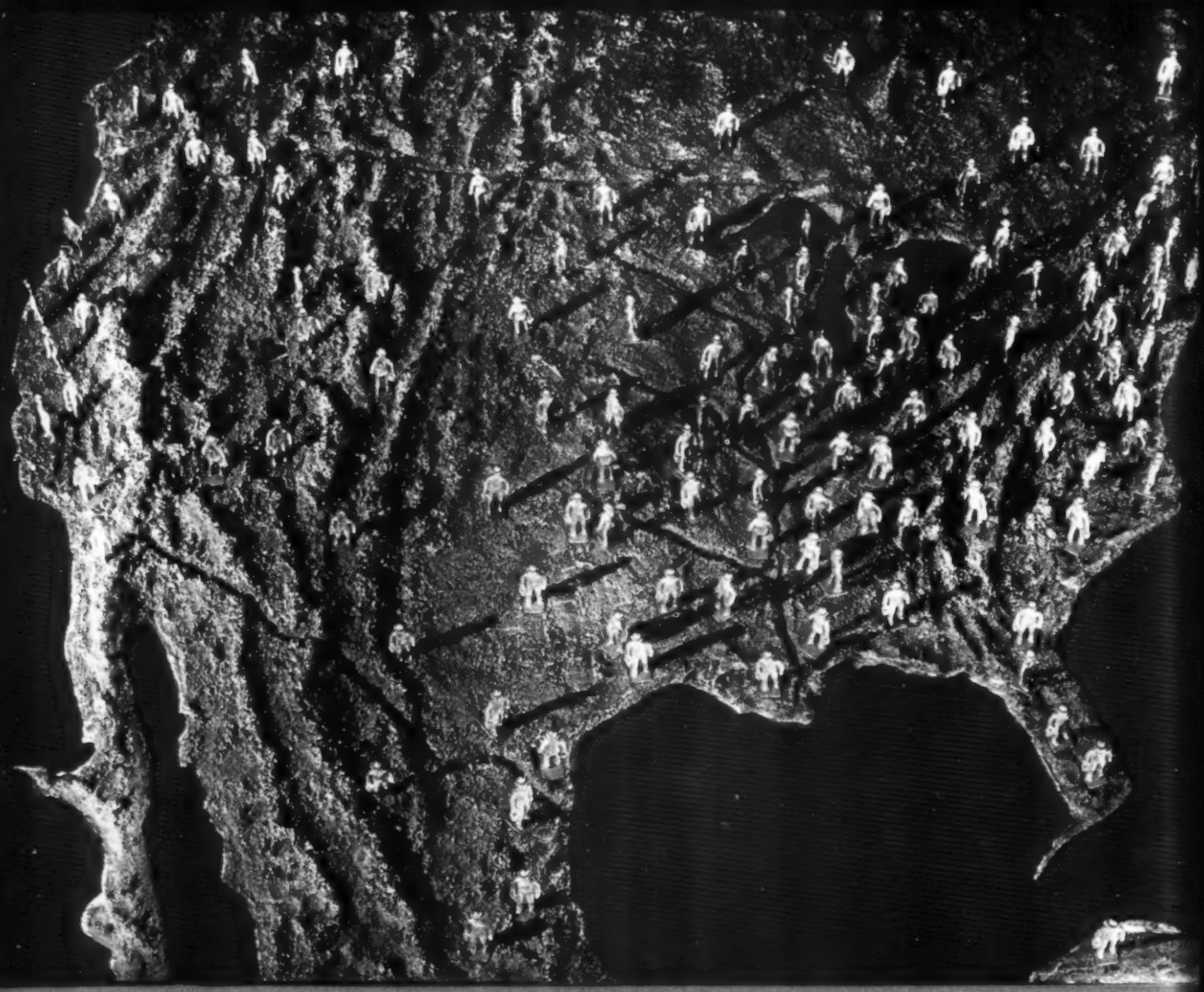
This is the second installment of abridgments of papers presented at the annual meeting of the **Technical Association of the Pulp and Paper Industry,** held in New York City, February 15-18, 1943. Monthly installments of these abridgments will appear in succeeding issues.

LOUIS ALLIS

A Size and Type Electric Motor for Every Industrial Requirement

THE LOUIS ALLIS CO., MILWAUKEE, WIS.

BUY WAR BONDS — BUY THEM REGULARLY.



268 capable and well equipped motor specialists stand ready to give prompt and efficient service on Louis Allis motors should the need arise.

They are located in about as many strategic spots throughout the entire United States.

A generation of constant effort has been spent organizing this army of motor-service "minute men."

Time and time again they have proved their merit by giving almost unbelievably quick emergency service—even in some of the most isolated spots in the country.

To machinery manufacturers especially—whose products are shipped to all parts of the country this type of service is invaluable.

THE LOUIS ALLIS CO., MILWAUKEE, WIS.

BUY WAR BONDS — BUY THEM REGULARLY.

extruding the volume from the hypodermic syringe onto the plate. After extrusion, the structure begins to build up again. Therefore, for all measurements, the interval of time between dropping the clay on the plate and starting the roll was standardized at 15 seconds.

In this work, the temperature was maintained within one degree of 23 C. Clay slips are not nearly as sensitive to temperature variation as are the Newtonian fluids.

To determine the uniformity of the films for Newtonian fluids, blue dye was dissolved in glycerol and patterns were formed on glassine paper. From reflectance measurements on the General Electric recording spectrophotometer, it was indicated that the deviation in thickness of the films did not exceed 5 per cent.

The uniformity of the clay patterns was tested by allowing the patterns on the roll and glass to dry, removing the film material, and weighing on a microbalance the amount of clay included by each of four fractions of the total areas. The maximum deviation in thickness from one section to another was 4.0 per cent—that is, the clay films were sufficiently uniform so that the thickness might be used as a direct indication of the viscosity of the clay at high rates of shear.

To insure reproducibility of clay slips, it was found necessary to control the amount of mechanical work done on the slips during their preparation. It was found that slips could be duplicated by mixing the suspensions in a ball mill, using steel ball bearings instead of pebbles, for a period of at least 1 hour. A 1-liter Abbé porcelain ball mill jar was used with sixty ¾ inch diameter steel ball bearings.

The proper amounts of water and dispersing agents were added to the jar, and 200 grams of dry clay were mixed in with a spatula. The steel balls were then added, and the jar was rotated at 62 rpm. The dispersing agents used in this work were tetrasodium pyrophosphate and sodium silicate.

At each interval of milling the jar was opened, the hypodermic syringe was filled with clay, and 2 minims of the slip were pressed onto the plate at the correct spot. The steel roll was released from the distance required for the desired speed, and the pattern thus formed was allowed to dry. The pattern was traced on glassine and removed, and the procedure then repeated for the next speed position. When the nip viscosity was measured at intervals of 10 cm. per sec. through a range of roll speeds from 20 to 140 cm. per sec., the curve of film thickness vs. speed was found to approach a straight line. To reduce the testing time, points were taken at speeds of 40, 60, and 80 cm. per sec. to establish these lines for the clay slips.

The change in viscosity measured at low rates of shear during milling was followed with a MacMichael viscometer, with the cup speed set at 28 rpm.

At a given percentage of pyrophosphate, the higher the clay concentration the higher is the nip viscosity, and the more nearly do the slips approach Newtonian flow.

The silicate has the same effect as the

It NEVER Gets Tired!

THAT'S one reason a single Towmotor can do the work of many men. But equally important is the fact that the "one man gang" lifts loads as heavy as 7000-pounds . . . moves them as fast as 10 miles an hour . . . stacks them as high as 25 feet. All together that means more jobs are completed in less time and at lower cost.

Would you like to learn more? Then send for a free copy of "The Inside Story," and learn how Towmotor can help you. Just write Towmotor Corporation, 1220 E. 152nd Street, Cleveland, Ohio.

TOWMOTOR

ARMY E NAVY

THE 24-HOUR ONE-MAN-GANG

★ ★ ★ ★

No. 450A Slitter Knife Grinder

Regular equipment consists of a 1 HP, 3600 RPM grinding wheel motor; ¼ HP, 1800 RPM knife spindle motor; grinding wheel 6" diameter, ½" thick, ¾" hole.

SLITTER KNIFE SHARPENING

CAN BE FAST and ACCURATE

A wide variety of circular knives and discs, 2" to 20" in diameter, are sharpened with speed AND precision on the Covel-Hanchett No. 450A Slitter Knife Grinder. It is especially efficient in grinding knives with long, slim bevels. Knives are easily aligned and changed. Horizontal swivel adjustment of grinding wheel motor permits grinding at any desired angle, from the least bevel to a square edge. Graduated scale provides accurate setting for any degree of bevel. Double adjustable slide mounting of grinding wheel and motor assembly permits any style of grinding. Any degree of bevel is maintained, without change due to grinding wheel wear or change in size of knife, once bevel has been set.

For complete data on No. 450A Slitter Knife Grinder write today to the pioneers in the industry.

★ SAW SHARPENERS
★ SAW STRETCHERS
★ KNIFE GRINDERS
★ SWAGES AND SHAPERS
★ WELDING CLAMPS

COVEL-HANCHETT CO.
BIG RAPIDS, MICHIGAN — PORTLAND, OREGON

★ ELECTRIC BRAZERS
★ ANVILS AND HAMMERS
★ BAND WHEEL GRINDERS
★ MISCELLANEOUS SAW & KNIFE FITTING EQUIPMENT

pyrophosphate, except that a smaller percentage is required to produce a given viscosity.

Apparently, the action of the steel balls during the milling period is much greater the higher the viscosity of the slip. Undoubtedly, as the balls fall through the slip, the shearing forces on the particles are much greater at the higher viscosities. The two apparent changes taking place during milling are a decrease in particle size and an increase in the hydration of the particles. The latter is probably the result of base exchange; the sodium of the dispersing agent replaces some of the calcium atoms in the clay lattice. Since sodium is more highly hydrated than calcium, the hydration of the clay is thus increased. This process actually removes water from the medium and increases the effective concentration of the clay, tending to increase the viscosity of the slip throughout the milling.

The shearing action of the balls tends to tear the particles apart, resulting in mechanical dispersion and increased efficiency of the dispersing agent. This process tends to decrease the viscosity of the slip. In the first stages of milling, the decrease in viscosity observed is probably due to mechanical dispersion and increased efficiency of the dispersing agent. Therefore, when excess pyrophosphate is used, the effects of hydration and dispersion counteract each other to some extent, and the change in viscosity on milling is not very great. However, if there is no excess pyrophosphate, the amount of pyrophosphate is not sufficient to satisfy all the newly freed valencies, and a reagglomeration of particles occurs which tends to increase the viscosity of the slip.

It is obvious that the addition of starch or protein adhesive to clay slips will greatly change the flow properties in any given case, depending upon the redistribution of electrolyte and water between the clay and starch. The presence of raw stock in place of the glass plate would extend the similarity of the procedure to actual coating conditions. Such experiments are visualizd as the logical steps to be taken next in this particular investigation.

Little reference has been made to the probable importance of clay particle shapes in the flow behavior of clays. Several electron micrographs prepared of the clays used in the present investigation revealed the fact that a satisfactory relationship between particle shapes and flow properties would necessitate a more comprehensive investigation than could be included in the present study.

A Theory of Box Compressive Resistance in Relation to the Structural Properties of Corrugated Board

JOHN R. LITTLE

The distinguishing characteristic of a box as opposed to a bag is its ability to resist forces tending to compress or distort it from its original shape. The measurement of this attribute is the function of the box compression (Olsen) test. No other adequate test has yet been devised to measure this quality of board, though it is evident that resistance to distorting forces is dependent on board properties as well as on box design. Thus, it should be possible to accurately measure those qualities of corrugated board on which the compression resistance of every box depends.

The flat crush test on corrugated board and the ring test on uncombined board were both devised to evaluate stiffness, but neither test by itself is completely satisfactory because the relationship between these tests and the box compression test is not definitely established. It is only known that, in general, an increase in the flat crush or ring test will cause an increase in the box compression test. While these tests are useful in controlling the quality of board, any method of testing corrugated board bearing a definite relationship to box compressive resistance should be a valuable aid in the interpretation of board quality and provide a better understanding of those properties of corrugated board which enable the box to resist distorting forces.

With this in view, a theory was devised and supporting data accumulated which indicates that the Top to Bottom compression resistance of box shapes may be predicted with reasonable accuracy from two separate properties of the corrugated board: (1) The compression strength when bend-

DABILITY

For many years "Old Faithful" has been a byword for dependable performance. Once every hour, day in and day out, as far back as man can remember, this famous geyser in Yellowstone Park has spouted for four minutes. In this brief time ten to twelve thousand gallons of water rush forth, the column rising to an average height of 140 feet. Then the flow ceases abruptly, to reoccur an hour later.

For dependable performance in every process of the Paper Industry, Powell Valves, too, are famous—the result of nearly a century of concentration on making valves—nothing but valves—the best valves it is possible to make. Powell Quality costs no more at the start and saves in the long run.

The Wm. Powell Company

Dependable Valves Since 1846

Cincinnati, Ohio

Fig. 1708

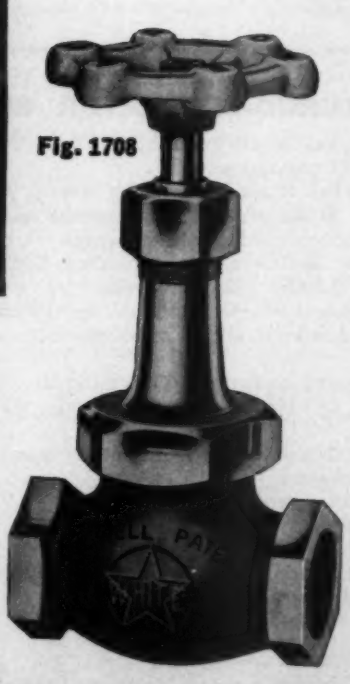


Fig. 375

Fig. 375—200-pound Bronze Gate Valve with screwed ends, union bonnet, inside screw rising stem and special hard bronze disc. Sizes ¼" to 3", inclusive.

Fig. 1708—200-pound Bronze Globe Valve with screwed ends, union bonnet, renewable seat, and regrindable, renewable hard bronze semi-cone, plug-type disc. Sizes ¼" to 3", inclusive.

The POWELL Line includes Globe, Angle, Gate, Check, Relief, Y, Non-Return and other types of valves in bronze, iron, steel, pure metals and special alloys to meet Industry's demands for DEPENDABLE FLOW CONTROL EQUIPMENT.

POWELL VALVES

ing is reduced to a minimum, and (2) the stiffness factor (EI) expressed as the product of the Modulus of Elasticity and the Moment of Inertia.

In developing the theory, the assumption was made that corrugated board is uniform in its properties and that the same laws could be applied to it which govern other elastic materials.

The humidity conditions for all tests were maintained at 45 per cent R. H. and 72 Fahr. It is important that all tests be made at the same humidity though not necessarily at 45 per cent.

A box shape was devised which enabled the manufacture of a large number of box lengths from the same run of board, without altering the setting of the scoring wheels. The flaps were all made 2 in. wide with notches instead of slots at the corners. The maximum compressive resistance of this shape is nearly identical to that of a regular slotted box of the same dimensions. This shape was used in preference to regular slotted boxes primarily because we wished to avoid the usual variations encountered in commercially run boxes. Square box shapes were tested in all cases and the maximum Olsen compression load was divided by four to arrive at the value of P (maximum load on one side of a box).

The quantity S, defined as the maximum stress per unit length, may be evaluated by measuring the resistance of a small test piece to direct compression loads, while reducing the bending effect to a minimum. For this purpose a test piece, 2½ in. x 3 in. in size with ¼ in. x ½ in. slots cut in each end was found to be suitable. This shape insures a failure in the narrow 2 in. section at the center of the test piece rather than at the top or bottom where otherwise the failures would occur. The slots should be made accurately avoiding damage to the board in the 2 in. space between slots. A power driven saw was found to be a convenient and rapid means of accurately slotting the board. The compressive resistance of this test piece is found by clamping it firmly in jaws ⅞ in. deep attached to the plates of a compression machine, thus preventing the tendency of the test piece to bend, except in the ¾ in. space between the jaws, believed to be negligible.

The maximum load on this test piece divided by 2 is (S), the maximum stress per inch of length. A sufficient number of tests should be made to assure a representative value for the material. Particular care should be taken to avoid finger lines at the waist of the test piece since the value of S is greatly affected by poor adhesion at the finger lines.

It is important that the quantity S be expressed in absolute units, (lb. per inch); therefore a compression machine which is readily calibrated against gravity is essential. The H&D crush tester, described in the March 10, 1938 issue of the Paper Trade Journal meets these requirements and has proved very satisfactory for this test.

The Stiffness Factor (EI) defined as the Modulus of Elasticity times the Moment of Inertia of a cross section of unit length may be found by measuring the deflection (d) at the center of a beam of the board supported at points a distance (L) apart and loaded at the center with a weight (W). If (b) is the width of the beam and the quantity EI is defined as above, then EIb is the Modulus of Elasticity times the Moment of Inertia of a beam of width b. The formula (Mark's "Mechanical Engineering Handbook") for the deflection of a simple beam may be written as follows:

$$EI = \frac{WL^3}{48db}$$

In measuring the deflection of the beam, the weight (w) should be chosen so that the value of EI is the same when tested with a greater load, say 1½w. (d) must be determined to the nearest 0.001 inch and care must be exercised in measuring this deflection so that no pressure is applied to the beam by the measuring device. In practice it was found desirable to start with two weights on the beam and measure the deflection when one weight was removed; then, turn the beam over, repeating the measurement.

While the data so far accumulated does not cover all possible combinations of board, a sufficiently representative group of boards were tested to justify the conclusion that the board compression strength and stiffness factor represented by S and EI bear a definite physical relationship to box compressive resistance when applied to corrugated board just as these properties of steel bear a definite relationship to the strength of beams and columns, and that therefore these are the factors controlling the ability of boxes to resist distorting forces. No effort has as yet been made to extend this work to include the end to end compression test on boxes.

The conclusions reached in this progress report are based on data collected at one particular manufacturing plant. It is conceivable that the relationships found under these conditions would not apply under the manufacturing conditions existing in all corrugating plants.

FOR SALE—TURBO-GENERATOR SETS

1—500 KW Allis Chalmers .8 p.f. 3 phase, 60 cycle, 240 volts, 1504 amps. 3600 RPM generator, with
1—Allis Chalmers-Parsons turbine, for 150# steam pressure, 100-deg. superheat, 20 lbs. absolute back pressure, with
1—exciter, on same shaft as turbine and generator,
1—300 KW .8 p.f. Allis Chalmers, a.c. generator, 240 volts, 3 phase, 60 cycle, 3600 RPM, 900 amps. with
1—300 KW Allis Chalmers-Parsons turbine, for 150# steam pressure, 100-deg. superheat, 20 lbs. absolute back pressure, with
Westinghouse switchboard equipment consisting of
2—Generator panels, 2" black slate 24" wide 90" high, equipped with
1—type 32 style 2B hand-operated rear mounted oil switch,
3—Rd. pattern AC ammeters,
1—A.C. integrating wattmeter,
1—D.C. field ammeter,
1—Field switch,
2—Plug receptacles for synchroscope and voltmeter,
1—Field rheostat handle with chain and sprocket control for basement mounted rheostat,
1—Exciter panel,
1—Synchroscope,
1—Westinghouse voltage regulator, type AB-3 on slate panel.

Can Be Seen in Operation—Inspection Invited.

WRITE, PHONE or WIRE.

CHICAGO ELECTRIC CO. 1321 W. Cermak Rd. Chicago, Illinois

A New Instrument for Measuring the Liquid Permeability of Paper and Other Pourous Materials*

WILLIAM H. LANE, Chemical Engineer
Plastics Division, Monsanto Chemical Co.

In Figure 1 a sectional view of the oil permeability instrument is shown. The specimen for the oil permeability test is sandwiched between two pieces of ¾ inch boiler plate, which are held together by four ½ inch studs located at the corners of a square concentric with the test area. The lower plate is perforated by a circular array of 0.076 inch holes, with ¼ inch spacing between centers. A 200 mesh screen lies on the surface of this plate and serves to support the sample. The upper half of the instrument has two concentric circular rims near its outer edge which bear directly on the sample. These rims

(*) A portion of a thesis submitted in partial fulfillment of the requirments of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., 1942. This work was carried out under the direction of George R. Sears.

SANTOBRITE in the water system of a paper mill provides effective protection against *both* fungi and bacteria... and the costly troubles those microorganisms can cause.

Santobrite is stable, non-corrosive to metals, non-volatile and practically odorless. It is produced in both powder and briquette forms, requires no expensive apparatus for satisfactory application and, when properly handled, presents no health hazard to mill operators or consumers of the mill product.

Depending on (1) the extent to which your water system is closed, (2) the characteristics of your stock and (3) the quality of your water supply... from 0.1 to 1.0 pounds of Santobrite are required for protection. Cost of treatment varies from 1½ to 18 cents per ton of paper or pulp.

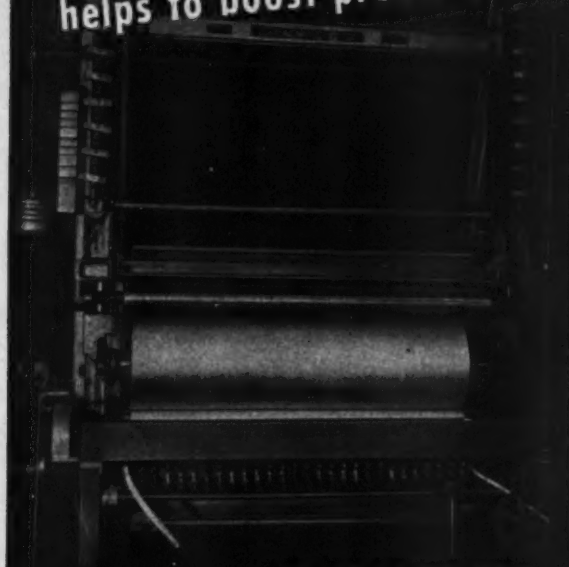
Limited amounts of Santobrite are still available on priority for slime and algae control. Application bulletin available upon request. For the latest information on availability, however, write or wire stating fully (1) the uses for which you require Santobrite and (2) the ultimate consumer of your production in which Santobrite is to be used. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, St. Louis, Missouri.

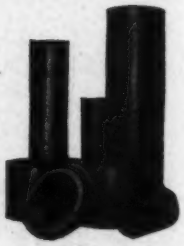
MONSANTO CHEMICALS

"E" FOR EXCELLENCE—The Army-Navy "E" burgee with two stars, "representing recognition by the Army and the Navy of especially meritorius production of war materials" over a two-year period flies over Monsanto.

SERVING INDUSTRY... WHICH SERVES MANKIND

CAMACHINE 10-14D
helps to boost production of Spiral Tube Containers





Camachine 10-14D winds rolls up to 60" in diameter, slits strips as narrow as ½". Speeds up to 1500 f.p.m. on paper, or 1000 f.p.m. on board. Can be furnished with score cut or shear cut slitter units as specified.

Keep spiral tube winders operating at top speed with rolls wound on the Camachine 10-14D.

To meet staggering wartime requirements for powder, shell and ammunition containers, Spiral Tube Winding Machines must keep operating steadily at top speed. Camachine 10-14D helps to boost the production of spiral tube containers by supplying the tube-winding machines with ample quantities of firmly wound board rolls, slit to the proper widths. Camachine 10-14D runs at 1000 f.p.m. on board rolls up to 50" diameter, winding on 9 5/8" drums to avoid cracking the board. Write today for interesting facts and figures concerning production obtainable with this equipment.

CAMERON MACHINE COMPANY

61 POPLAR STREET, BROOKLYN, N. Y. · MIDWEST OFFICE 111 WEST MONROE STREET, CHICAGO

are 1/16 inch wide and project 1/16 inch below the lower surface of the plate. From the dimensions shown in Figure 1, it is seen that the area of the sample subjected to test is 3 inches in diameter and that it is surrounded by an annular "guard-ring" area having a width

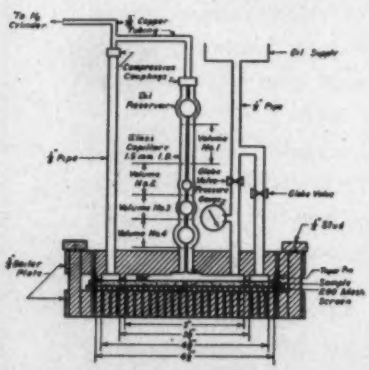


Fig. 1—Oil permeability instrument.

of ⅜ inch. Into the top plate there is sealed a glass capillary (the inside diameter of which is approximately 1.5 mm.), whose lower end is flanged so as to bear against the tapered shoulders of the hole in the top plate. The capillary has four small bulbs blown in it. The upper one serves as a reservoir for the oil. The volumes indicated have the approximate values of: No. 1 = 0.05 cc., No. 2 = 0.25 cc., No. 3 = 1.0 cc., and No. 4 = 4.0 cc. Oil is admitted from the oil supply to both the guard-ring and the test areas by the two openings shown near the right edge in Figure 1. These connections, as well as those leading to the nitrogen cylinder, are made with ⅛ inch standard steel pipe. The pressure gauge is a 0 to 100 lb. "test gauge." A thermometer well (not shown in Figure 1) is so located in the top plate that a 5 to 50 C. thermometer, graduated in tenths of a degree, may extend for some 3 or 4 inches laterally into the plate.

By applying the same pressure to the oil above the guard-ring area as is applied to the oil above the test area, there is no pressure differential tending to drive the oil laterally in the sheet between the test area and the guard-ring area of the sample. In this way, edge effects are eliminated and lateral flow of oil is avoided.

The instrument can be tested for leakage by replacing the sample with a piece of heavy sheet rubber and applying a large pressure. Lack of motion of the meniscus of the oil in the capillary shows the absence of leaks.

In making permeability measurements, one must know accurately the viscosity of the oil in question over the temperature range of the constant relative humidity room in which all calibration and testing work on paper samples is done.

Calibration is accomplished by supporting the top half of the instrument on two short pieces of 2 by 4 and allowing the oil to flow out of the capillary onto a weighed cloth. From the increase in weight of the cloth and the density of the oil, it is possible to calculate the volume delivered. Different rates of efflux are obtained by applying a slight pressure from the nitrogen cylinder.

For a sample of unknown permeability, rough measurements must first be made to establish the permeability range. From these it is possible to decide whether the oil permeability measurements can be made on a single sheet, or whether a specimen consisting of several sheets in series must

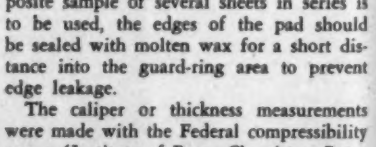


Fig. 3—Calibration curve for Valvoline SAE-50.

be used to secure an accurately measurable pressure drop in the instrument. If a composite sample of several sheets in series is to be used, the edges of the pad should be sealed with molten wax for a short distance into the guard-ring area to prevent edge leakage.

The caliper or thickness measurements were made with the Federal compressibility gauge (Institute of Paper Chemistry, *Paper Trade J.* 109, No. 13: 18-20, 22, Sept. 28, 1939). In calculating oil permeabilities, that value of the caliper must be used which is obtained at the pressure employed in the oil permeability measurement.

Prior to making the oil permeability

measurements, both halves of the instrument, as well as the 200 mesh screen, are blotted dry of oil. This prevents the possibility of any oil penetrating the sample from the bottom side. The sample is then placed on top of the 200 mesh screen. The top half of the instrument is put in place and quickly bolted down. Oil is admitted from the oil supply, the desired pressure applied by adjusting the flow of nitrogen from the cylinder, and measurements begun at once. If the sample is a single sheet, it is completely permeated by oil even before the first measurement can be completed. If the sample consists of several sheets in series, the sample is flushed several times at a high rate of oil flow to aid in removing the air. An oil permeability measurement is made by noting the time required for the amount of oil represented by Volume No. 3 to flow through the specimen. The volume in cc. is read from the calibration curve. The temperature of the upper half of the instrument, and of the oil within it, is read to the nearest 0.02 C. The viscosity of the oil can be read from the curves in Figure 3. During a permeability determination, the pressure is recorded to the nearest 0.1 lb. per sq. in.

The range of measurable permeabilities is about 4,000 fold. It is governed by three factors: the range of the pressure gauge, which is from 5 to 100 psi; the range of sample thickness, which is from 1 to 20 sheets in series; and the range of the time of efflux, which is from 40 seconds up. By using oils of higher or lower viscosity and recalibrating the instrument, this range may be considerably extended.

The Ultimate Strength of Pulp Fibers and the Zero-Span Tensile Test

JAMES d'A. CLARK[1]

The tensile strength of the individual fibers has been recognized for a long time as one of the fundamental properties of pulp, but the smallness of the fibers has prevented very much work on its measurement.

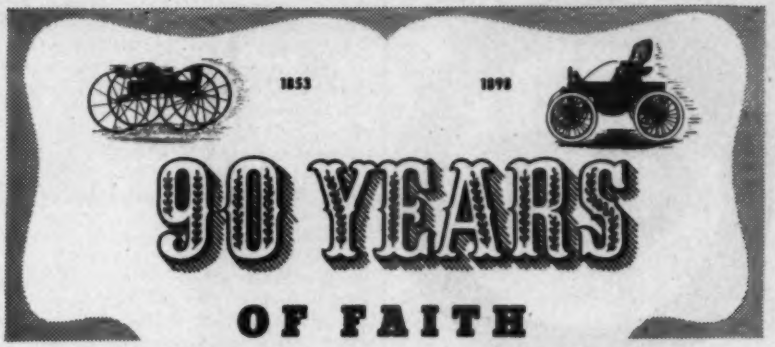
In 1923, Hoffmann Jacobsen (Hoffmann Jacobsen, P. M., *Paper Trade J.* 81, No. 22: 52-53, Nov. 26, 1925) proposed his "Null Reislange" test, in which he measured the tensile strength of paper with the edges of the two sets of jaws of the tensile tester in contact with each other. He indicated that the results were directly proportional to the average ultimate strength of the fibers.

The zero-span tensile jaws, as originally proposed by Hoffmann Jacobsen, had jaws only 5 mm. broad so as to more intensively and better grip the sample to be tested.

In a thesis published in 1930 (Günther, Otto, F., Thesis, Tech, Hochschule, Dresden, 1930. 183 p.), Günther described the design of a pair of jaws which he thought would carry out the test more accurately

(1) Research Associate, The Institute of Paper Chemistry, Present address: Quartermaster Depot, Subsistence Research Laboratory, Chicago.

A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, June, 1941.



IN 1853 a young man, believing in the sound principles of the American Free Enterprise System, started making wagons and carriages. Adhering to these principles, his business grew. He incorporated in 1888.

With unlimited faith in the American System, this growing Cleveland Company began the manufacture of electric vehicles in 1898. In 1901, the Baker Electric Torpedo startled the world with a record speed of 104 miles per hour. This same year, Baker built the first shaft-drive automobile. In 1911 Baker contributed the worm-gear drive. In 1917, foreseeing our great industrial development, Baker went into the business of making industrial power trucks. Thousands of these trucks are today speeding production and the handling of material all over the world. A second Baker plant builds commercial truck bodies to meet the specific requirements of public utilities.

Today we are at war. Along with other American industries, The Baker-Raulang Company has enlisted for the duration. Both plants are engaged 100% in war production. At the same time we are looking forward to playing our part in the rebuilding of peacetime industry, as we have done three times before in our history.

After 90 years—during which we survived more than a dozen major depressions, we still have faith in the System of Free Enterprise which has built the world's greatest nation—a nation capable of saving the world from despotism, through industry. We trust in the common sense of the American Public to justify our 90 years of faith—to keep America free for the rebuilding job in the critical years ahead.

THE BAKER-RAULANG COMPANY

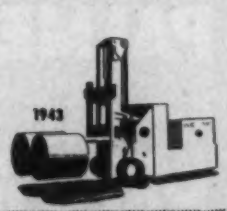
UTILITY BODY DIVISION
1280 WEST 80th STREET

★

INDUSTRIAL TRUCK DIVISION
2168 WEST 25th STREET

CLEVELAND, OHIO

Baker



G-T

PACKINGS

stay soft

because they are

Self-lubricating

Pull apart a piece of any G-T packing, and you'll find the innermost strand as thoroughly saturated with lubricant as the outside of the packing. In contrast to ordinary packings, these inside strands are internal reservoirs of lubricant . . . they make G-T packings *self-lubricating*.

And the lubricant is not ordinary oil . . . it is specially compounded in our own plant for each class of service. That's why G-T packings stay soft . . . last longer . . . protect shafts, rods and stems. The table below tells you the right G-T packing for your requirements.

WRITE FOR LITERATURE

BRAIDED

For rods and shafts; layer-over-layer construction insures uniformly even bearing surfaces.

TWISTED

For valve stems; each strand a perfect piece of lubricated packing. One spool packs several sizes of valves.

GREENE, TWEED & COMPANY

Bronx Blvd. at 238th St., New York, N. Y.

PALMETTO

for steam, hot water, air. PALCO for water. PELRO for oils. CUTNO for alkalis. SUPERCUTNO (blue asbestos) for acids. KLERO for foods.

SELF-LUBRICATING

PACKINGS

and he subsequently used them to study the influence of high pressures on pulps.

The design of the zero-span jaws used for the present work is based on that of Günther, with two principal improvements which insure perfect alignment of the jaw edges.

Figure 1 is a part front and part sectional front view of the jaws, which are made of hardened tool steel. Included are front and side views of both the movable and the fixed jaws. The sides of the movable jaws fit snugly into the channels (C) in the fixed jaws, and the countersunk holes (A) in the fixed jaws and the tapered ends of the screws (B) in the movable jaws insure permanent alignment of their edges. A later added improvement was the provision of a lock-nut (not shown) on the tapered ends of the screws (B) so as to hold them perfectly rigid. The faces of the jaws have small serrations, leaving, however, flat areas at their very tips; after hardening, grinding, and assembly, the faces and edges of the jaws are lapped in position, insuring that they fit within 0.0001 inch.

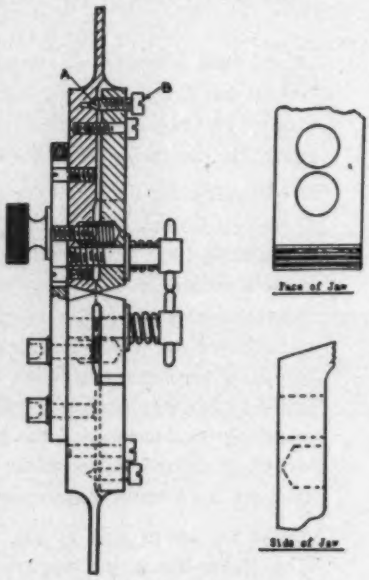


Fig. 1—Zero-span jaw attachment.

Figure 2 illustrates the sequence of tightening the jaws of the zero-span tensile attachment on a test specimen. The strip is shown inserted between the opened jaws in A; when one of the jaws is tightened as shown in B, the specimen is squeezed into a shape somewhat as shown. The other jaw is then firmly closed on the specimen as shown in C; it is clear, depending on the bulkiness of the sheet that there will inevitably be a zone along the interior of the specimen at X, where not only will there be lateral compression but also a definite longitudinal compression. Therefore, when the specimen is placed under load and the sets of jaws commence to separate, the fibers in the interior zone (at X) will not be able to add their quota to the over-all strength of the specimen until the jaws have separated sufficiently to remove the compression on the fibers in this zone and to subject them to tension. However, because the jaws have to move apart slightly to do this, tension cannot be applied to these fibers until the surrounding exterior fibers of the strip have been appreciably strained, by which time the latter are severely stressed, and it is easy to conceive of the exterior fibers of a very thick soft sheet being actually ruptured before the interior fibers are called upon to exert any tensile pull at all.

This consideration makes it clear why tests on thicker sheets of blotting paper are considerably affected by the tightness of clamping and why, on the other hand, the clamping pressure scarcely changes the tests on hard cellophane strips. This, in part, is the reason for the zero-span tensile test increasing with beating, because the bulk then also decreases. However, there is another factor to consider. Notwithstanding the fact that, when the jaws are in proper adjustment, there is virtually a zero span at the commencement of the test, no load can be applied without a concurrent strain being induced in the material and, the more compact the sheet becomes, as a result of beating, the less becomes the strain required to withstand a given stress, which means that, after beating, the span is also less when fracture occurs.

Because the jaws have to separate slightly before much tension is applied to the specimen, very short fibers cannot be gripped by the jaws at both ends and, excepting the part they play as a filler or binding material in the aggregate of the sheet structure, with resulting increase in the modulus, they have no effect on the test result. Moreover, because the test strip is subject to very severe local strains in being clamped by the jaws and by the first slight movement apart of the jaws, it is probable that the bonding effect of short fibers and debris (except for the contribution they make in reducing the size of the compression zone during the clamping) is negligible. It is clear, therefore, that fiber length plays a considerable part in the test and it is not surprising to find that the shorter the fiber, the lower the test, especially with the unbeaten pulp. To go to an extreme, a sheet of fine particled material (such as raw starch) would give a negligible reading, and yet a dry film of cooked starch would give a zero-span reading which would correspond closely to the normal tensile strength of the strip.

Fig. 2—Effect of tightening the jaws of Zero-span tensile attachment.

Although the test does not constitute a fundamental measurement of ultimate fiber strength, if the jaws are carefully made and with a pulp having fibers of normal length which have been made into a moderately compact sheet (after the pulp has been slightly beaten), the test should be a fairly good indirect one.

To those who like to use the maximum bursting strength developed by beating as a measure of pulp quality (which, incidentally, involves the beating of pulp

Speed Your Production

You Can Step Up Production And Get A BETTER SHEET With NORWOOD CALENDERS

YOU can step up production and get a better sheet with Norwood Calenders because these calenders are designed and built to meet specific finishing problems of modern paper makers.

Among the many features of present-day Norwood Calenders you will find: Adjustable roll journal boxes that will stay set, fly roll bearings that can be adjusted to any angle, a new power saving drive, a continuous oiling system, and many other features to give you fast production and dependable service.

Norwood Calenders are giving exceptionally satisfactory service in hundreds of mills throughout the United States and Canada, and we shall be glad to send you a list of these mills together with reproductions of letters from many of the mill men who depend upon Norwood Calenders to solve their finishing room production problems.

Now is the time to check up on your calenders and make plans for replacements or rebuilding . . . to take care of your present production or to look ahead to post-war production.

Send For Engineering Data Units

We have helpful Engineering Data Units covering Norwood Equipment. Send for your set today.

Filters: Ask for Portfolio F for a complete set of data units on Norwood Water Filters.

Calenders: Ask for Portfolio C for a complete set of data units on Norwood Calenders.

While we need a satisfactory priority in order to get the materials to build these good Norwood Calenders for you at the present time, we can do a lot toward helping you keep your calenders in condition or making additions of Norwood features to modernize your calenders and step up their production. Let's discuss your finishing problem. Write us today.

Get a Good Start And a Good Finish With
NORWOOD
WATER FILTERS AND PAPER FINISHING MACHINERY

The Norwood Engineering Company
16 No. Maple St., Florence, Mass.

Helen Stevens, Olympic Games record holder, now operates a Clark Carloader in the Shipping Department of the St. Louis Plant, Airplane Division, Curtiss-Wright Corporation. Miss Stevens' mark of 11.5 seconds for the 100-meter dash remains unequalled.

GANGWAY!

For the second shift operator. She's ready for quick action — to load or unload vital materials of war.

CLARK FORK TRUCKS

gas or battery powered, hold to time table timing — leave and arrive at stations on schedule to maintain schedules.

Pick, lift and tier loads of 1000 to 7000 lbs.

WRITE TODAY — OUR ENGINEERS ARE READY TO SERVE YOU.

CLARK TRUCTRACTOR

DIVISION OF CLARK EQUIPMENT COMPANY

BATTLE CREEK, MICHIGAN, U.S.A.

away beyond normal commercial practice), the employment of the zero-span test offers an extremely simple, direct, and reproducible measure of the same kind. Although admittedly arbitrary to a large extent, nevertheless, the zero-span test is not nearly as arbitrary and subject to the same vagaries as the usual determination of "maximum Mullen." The new test is also more informative because, when the normal tensile is also determined, the ratio of the two gives a good measure of the adhesion between the fibers, so that it can be seen at once whether the weakness of the sheet is caused by poor bonding or by defective ultimate fiber strength.

APPARATUS

1. A paper tensile strength tester (pendulum type) with provision for setting the jaws 6 inches apart.

2. A zero-span jaw attachment, having hardened steel jaws 15 ± 0.05 mm. wide, the edges and faces of which are in perfect alignment when clamped together (See Fig. 1).

For pulp test sheets, cut strips about 1 or 1.5 cm. wide and any convenient length over 1.5 cm.; for paper cut the strips from the two principal directions.

PROCEDURE

Insert the specimen strip to be tested between the jaws after properly adjusting them and clamp the strip in position squarely across the sheet direction being tested.

Note: There is no need to cut the strip to an exact width of 15 mm., as at fracture, the resistance offered by the strip protruding from the sides of the jaws is negligible, because the paper outside the nip cannot stretch enough to take up any appreciable load before the strip breaks.

Set the speed of the tensile tester so that the strip breaks in 15 ± 5 seconds (the time seems to be no more or less important than in the normal tensile test). The necessary speed may be determined from a preliminary test.

As soon as a load is put on the attachment, loosen the clamping screw, thus transferring the load to the paper. When it breaks, stop the tester, note the reading on the scale, and remove the broken test strip.

Because of the small clearances available, after the fracture of the specimen, care should be taken not to reverse a motor-driven tester without first releasing the pawls on pendulum. Keep holding them down until the jaws are together and the lower clamp is in its top position.

Clamp the upper and lower jaws together with the knurled screw, then insert the same strip at a new place or use another test strip and repeat the test. For test sheets the results are more uniform than the usual tensile test so that 10 readings are ample. With paper, make at least 10 tests in both directions.

Average the readings and subtract the weight of the upper jaw assembly.

For pulp test sheets, give the average reading (corrected for the weight of the lower jaw assembly) to 3 significant figures.

For paper, give the average test results for both principal directions as in the normal tensile test.

Conservation in and by Chlorination

R. B. MARTIN
Industrial Division
Wallace & Tiernan Co., Inc.

Curtailment of chlorine supply has been confined to bleaching, or in general to the luxury uses of chlorine. It is recognized, however, that the chlorine industry is in better shape today to handle the needs of the pulp and paper industry than ever before.

There has been no curtailment of chlorine for such essential uses as the control of slime or the improvement in bacterial quality of food papers. On the contrary, increased uses are encouraged in those cases in which an improvement in production or quality will result. To some degree the ammonia situation is similar, except that anhydrous ammonia and aqua ammonia have been considered temporarily more critical, and some mills have been asked to convert to the use of ammonium sulphate.

Also important to the conservation program is the proper use of chlorine that will reduce power requirements of the individual mill, or will increase the useful life of paper machine clothing, of screen plates, of pumps, and of other mill equipment that now come under the critical-materials classification.

Upon reduction in bleaching, and the

mixing of bleached with unbleached pulps to meet the established brightness ceilings, an added burden has been placed on slime control treatments. This has been due to increase in bacterial infection resulting from present day operating methods. In certain instances increase in chlorine usage for slime control has made possible greater reductions in chlorine used for bleaching.

Chlorination and break-point chlorination of both fresh and recirculated waters have performed satisfactorily in several hundred mills, with these well-recognized savings in mill operating costs, now doubly important in a conservation program:

Improvement in quality of the finished product by elimination of slime spots, pin holes, and objectionable odors.

Improved sheet formation through elimination of slime films on paper fibers and on paper machine wires.

Improved sizing and coloring through elimination of products of bacterial decomposition.

Saving in paper making materials through elimination of decomposition losses, and through reduction in quantity of reworked stock, culls, and rejects. Savings in heat, power, and materials through efficient operation of slime-free closed systems, and through elimination of necessity for frequent clean-ups.

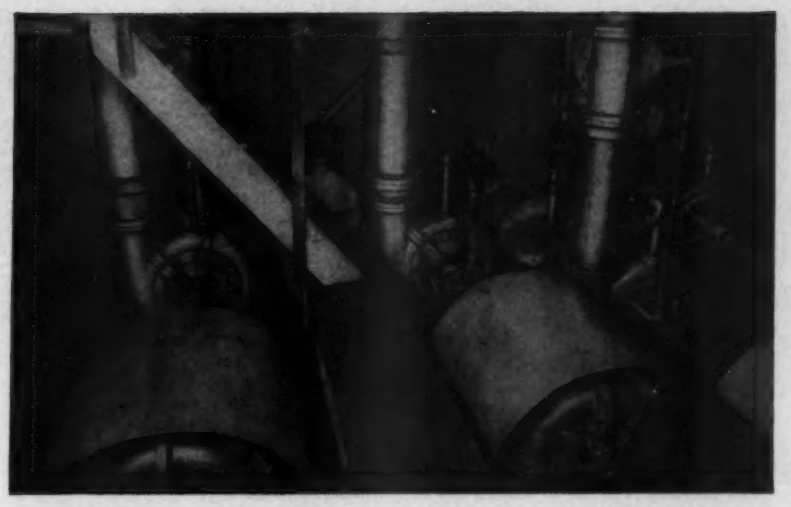
Reduced fuel requirement and improved production capacity through improved felt condition and more effective water removal. Increased useful felt and wire life.

Reduced fuel and power costs through improved efficiency of condensers and low temperature heat exchangers, of screens and savealls, of filter plant equipment.

Elimination of direct and indirect bacterial corrosion, and control of hydrogen sulphide corrosion of machine wires, screen plates, pumps, piping, etc.

Perishable foods in increasing quantities are being wrapped and packaged in paper and paper products. Chlorination technique has kept pace in the paper mills, enabling the mills to meet the increasingly stringent requirements encountered in the manufacturing and handling of papers designed for these uses. In this work, break-point chlorination shows considerable promise, in control of the more resistant spoilage organisms as well as a means of eliminating objectionable tastes, odors, and color characteristic of the usual mill water supply. As new requirements are established for microbiological quality of food papers, to take into consideration the types of foods that are to be packaged, each mill will merit study to assure efficient use of established chlorination practices.

With only infrequent exception, all waters commonly used for cooling purposes carry infection of micro-organisms capable of forming biological slime films on surfaces with which these waters come in contact, as recognized in pulp and paper operations. Incubation and multiplication of these slime-forming organisms are accelerated at the warmer water-contact surfaces of low-temperature heat exchangers, and steam or vapor condensers. Foreign materials become mechanically entrapped in the slime and in this way complicate and bulk the accumulation on the heat exchange surfaces, typical of bio-fouling. These deposits may in some cases be confused with



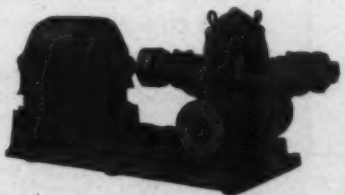
PUMPS . . .

that are not merely "adapted to" but DESIGNED FOR . . . *YOUR* requirements

MORRIS has twelve different types of centrifugal pumps for handling abrasive materials such as slurry, sand, gravel, etc. . . . five different types for handling pulpy materials such as sewage, paper stock, etc. . . . and a standard type for every clear water service.

Therefore, whatever your pumping requirements may be, you can be sure of an exactly suitable Morris design . . . not merely an "adapted" design. Your benefits are higher efficiency . . . longer service . . . lower maintenance expense. Write for bulletin on the Morris design for your needs.

ST-P Non-clogging Pump — Guaranteed Non-binding for Pulpy Mixtures



Double Suction Horizontally Split Pump for Clear Liquids

MORRIS MACHINE WORKS — MORRIS ESTABLISHED 1864 — BALDWINSVILLE NEW YORK

CENTRIFUGAL PUMPS

scales, which frequently prove to be of organic origin. Speed of deposit characterizes organic slimes and scales, the actual speed of formation depending upon the nature of the biological infection, temperature, food materials present, and nature and condition of inorganic materials carried in solution or in suspension in the circulating-water.

Efficient operation of heat exchangers and condensers requires that the water contact surfaces be cleaned at frequent intervals, or preferably that they be kept clean by suitable preventive treatment. Where a deposit is allowed to collect, loss of efficiency is immediately apparent, reflected in lowered yield, or in increased fuel or power requirements. Periodic cleaning requires that the unit be out of service and therefore non-productive. Preventive treatment must be used to maintain continuous operation at optimum efficiency.

Of particular interest is the ability to control, through chlorination, bacterial corrosion or destruction of equipment and plant structures (W&T T.R. RA-1020). It has been shown that there exists a definite relationship between microbiological growth accumulation and coincidental differential cell development (W&T T.R. 474). Resulting corrosion losses have in turn been brought under control by suitably planned chlorination.

In steam-electric generation, slimes on condenser tube surfaces result in loss of condenser vacuum or increase in turbine back pressure. This means an increase in fuel requirement per unit of power generated. Also periodic machine outages for cleaning of condensers, generator air coolers, and auxiliaries are objectionable for several reasons, beyond the loss of generating capacity. This has become particularly important in mechanical difficulty in shut-down and start-up of high pressure or topping units. Fuel savings alone are sufficient to warrant investment in chlorination, the average plant showing a full factor of 7 per cent per inch Hg increase in turbine back pressure.

Where circulating-water volumes are large and pollutional loads heavy, the Wallace & Tiernan Intermittent Chlorination process provides the utmost economy in chemical costs (W. & T. T. R. 468). In smaller, or closed recirculated spray pond or cooling tower systems, continuous chlorination may prove more economical. Here air-borne slime infection must be controlled. An efficient spray pond or cooling tower becomes automatically an effective air scrubber. Thus the air benefits, at the expense of slime infection of the recirculated water. Each individual problem justifies careful study, based on a background of operating experience.

When tidal waters are used for circulating-water supply, marine growths and higher biological forms may be equally as costly in plant operation and maintenance as are the more common micro-biological slimes. The Intermittent Process in such cases is modified to bring under control those higher organisms or sea grasses causing the growth difficulty.

With the end of the war there will be a renewed competition for quality. Time may then be lacking for planned applications of the new developments in water uses and microbiological treatments, and it may therefore be well to plan now as perfect insofar as possible the steps to be followed in meeting the post-war competition for quality and for production.

A Study of the Relationship Between the Air Permeability and Oil Permeability of Paper*

WILLIAM H. LANE, Chemical Engineer, Plastics Division, Monsanto Chemical Co.

This investigation was undertaken in the hope that it might illuminate some of the many interesting conjectures regarding the mechanism of the flow of printing ink into paper during the printing process.

A description of the instrument which was designed and constructed during the course of this investigation for the measurement of the oil permeability of paper is given in a previous publication (Lane, W. H. Paper presented before the Annual Meeting of TAPPI, Feb., 1943).

It is not necessary to give a detailed description of the air permeability instrument, as it was modeled rather closely after that described by Carson (Carson, F. T., *J. Research Natl. Bur. Standards* 12: 567-585, 1934) (Carson, F. T., *J. Research Natl. Bur. Standards* 24: 435-442, 1940). The test area defined by the permeability cell was 3 inches in diameter, and it was surrounded by an annular guard ring ⅛ inch in width.

The oil permeability instrument had a test area and guard-ring area identical with that of the air permeability instrument. Both the air and the oil permeability instruments were equipped with two taper pins which had exactly the same spatial relationship to the test area in each instrument. This assured the testing of exactly the same specimen areas in the two instruments, as the specimens were punched to fit the taper pins prior to testing.

The caliper measurements were made with the Federal compressibility gage (The Institute of Paper Chemistry, *Paper Trade J.* 109, No. 13: 18-20, 22, Sept. 28, 1939). The caliper should be measured at the same pressure as that used in the oil permeability measurement.

In the operation of both the air and oil permeability instruments, sufficient clamping pressure was always used to cause the ring which separates the guard-ring and test areas to emboss the sheet.

The handsheets used in this investigation were prepared in accordance with TAPPI Standard T 200 m-40, except that they were pressed and dried between Whatman's No. 1 filter papers so as to give the same surface to both sides of the sheet and thus avoid the glazed effect produced on one side of the sheet when prepared with the British equipment.

(*) A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., 1942. This work was carried out under the direction of George R. Sears.

Let's all help to
KEEP 'EM FLYING!

It's a far cry from a paper mill to the battle front . . . yet the corners we all cut, the materials we all save, the efforts we all make have a vital bearing on the ultimate success of our boys over there.

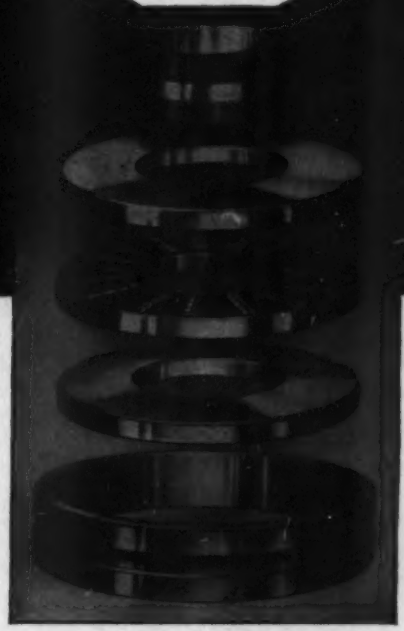
You can help by keeping your present equipment in service and in good repair. Call us for assistance in getting maximum use and long life from Trimbey installations.

Makers of
CONSISTENCY AND WEIGHT REGULATORS
FLOAT VALVES
PULP SCREENS AND KNOTTERS
METERING SYSTEMS

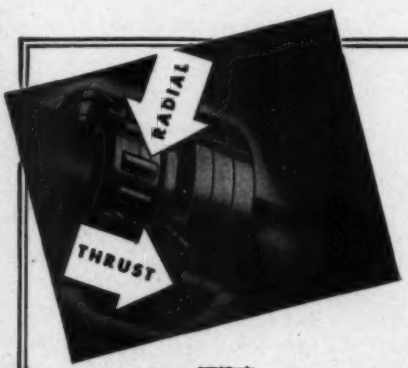
TRIMBEY
Machine Works
GLENS FALLS, N. Y.

For Longer Thrust-Bearing Life USE ROLLWAY'S *Right Angled Loading*

All loads carried at right angles to the axis on short and staggered solid-cylindrical rollers.
NO
OBLIQUE RESULTANTS
on rollers.



THE right-angle-loading rule for roller bearings is safer to follow because it's simpler. It splits complex loads so that the two fundamental components of pure radial and pure thrust are each carried at right angles to the roller axis. NO OBLIQUE RESULTANTS tend to squeeze the rollers from between the races. Thus, in thrust bearings, rubbing contact between the roller ends and the retainer is held to a minimum. In radial bearings, there is less wear-back on the radius of the races. Friction is reduced; bearing capacity increased. You don't have to depend upon maintained oil-film for low-torque starts. The net result is smoother running, longer life, reduced service cost, and less down-time due to bearings.



IT'S A BASIC PRINCIPLE WITH ROLLWAY

- All radial loads carried at right angles to the roller axis.
- All thrust loads carried at right angles to the roller axis.

ALL ROLLWAY ROLLER BEARINGS ARE LOADED THE RIGHT-ANGLED WAY

One of the pioneer American manufacturers in the design and application of roller bearings to heavy industrial uses, Rollway has consistently specialized in the right-angled loading of solid-cylindrical roller bearings. That's because 35 years of experience has proved that no short-cut or compromise provides the same effectiveness and lasting qualities as these bearings in *pure radial and pure thrust types.*

SAE and AMERICAN STANDARD METRIC SIZES

Rollway has developed many variations of its solid-cylindrical roller bearings in SAE and American Standard metric sizes, each having definite characteristics to meet exacting needs. Take full advantage of this wide choice of types and sizes, and of Rollway's specialized bearing experience. Just send us your design, or ask for free, confidential bearing analysis and recommendation.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, NEW YORK

BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**

SPOT WEAR
In Fourdrinier Wires
This photomicrograph shows what happens to those small dents caused by stock lumps, rust, slime or other objects passing between the wire and the takeup or return rolls. Because these dents are "out of plane" they receive the most abuse and soon wear through. This results in a hole like that shown above.
Take every precaution to prevent these dents and add to the life of your wires.
This is the second of a series on factors contributing to wire life.
Appleton Wire Works, Inc. Appleton, Wis.

It was noted immediately at the beginning of this work that the oil permeability was not equal to the air permeability. For many samples, the ratio of air to oil permeability ranged from 1.4 to 1.7; the oil permeability was always less than the air permeability.

It was also found that, except for the most permeable specimens, the oil permeability steadily decreased as oil was forced through the specimen.

There seems to be no satisfactory explanation for the observed decrease in oil permeability as oil is repeatedly forced through the specimens.

Handsheets with varying filler content show that the permeabilities increase with the amount of filler. Calcium carbonate was much more effective than coating clay in opening up the sheet structure.

Likewise, permeabilities increased with increasing amounts of rosin size in the sheet. There was no definite relationship between permeability and amount of starch.

The unexplained decrease in the oil permeability with continued flow of oil and the lack of constancy in the ratio of air to oil permeability indicate that air permeability cannot, in general, be accepted as a reliable index of oil permeability.

Features of Adjustable Speed Electric Drives to Meet the Requirements of the Paper Industry

R. R. BAKER

Industrial Engineer, Paper Mill Section
Westinghouse Elec. & Manufacturing Co.

In most of the paper mill applications requiring adjustable speed, it is necessary to maintain reasonably good speed regulation at all speeds within the productive speed range. This is particularly true of all of the paper forming operations where any variation in operating speed materially affects the characteristics of the sheet being formed. Where the individual sections of a paper forming or processing machine are motor driven, it is necessary not only to maintain close "overall" speed regulation, but it is also necessary to match the speed of the adjacent sections with a high degree of accuracy. With paper processing operations the speed requirements are not as critical as with paper forming operations. As the sheet has already been formed, slight variations in operating speed may be tolerated. Similar variations in operating speed are also permissible with the auxiliaries which require speed adjustment, such as wire shakes, rotary screen filters, and feed conveyors. With the drives for such machines it is possible to make manual adjustments from time to time to compensate for variations in the operating conditions.

There are available a number of types of electric drive, including both alternating and direct current motors, which are suitable for adjustable speed operation.

Fundamentally, the d-c. motor is the most suitable for adjustable speed operation. As in most mills, the primary power supply is obtained from a-c. generators, it is necessary to provide conversion equipment to obtain a suitable power supply for the d-c. motor. In certain cases, the lower first cost of the wound rotor induction motor drive when compared with that of the d-c. drive will justify the installation of the a-c. equipment. The d-c. drive provides closer speed regulation over wider operating speed ranges and is therefore more suitable where a wide operating range and close speed regulation are important. Where the control functions are of a complicated nature or are to be performed automatically, the d-c. drive is preferred due to the simplicity of its control and speed regulating circuits.

In selecting either a-c. or d-c. motors for adjustable speed operation, due consideration must be given to the torque capacity of the motor at reduced operating speeds. All self-ventilated motors depend upon the fan action from their rotors to provide sufficient air circulation to carry away the heat resulting from the motor losses. The reduced air circulation at the lower speeds materially reduces the ability of the motor to dissipate heat. This reduction in heat radiating capacity does not apply to forced ventilated motors, as the air circulation is independent of the operating speed.

The wound rotor induction motor drive consists of a wound rotor induction motor

with primary control of either manual or magnetic type and with secondary resistance control either manually or motor operated.

The usual control functions of starting and stopping are obtained on the primary control switch which is interlocked with the secondary control so that the equipment can be started only when the secondary control is in the resistance "all in" or starting position. Both acceleration of the drive and operating speed adjustments are under control of the secondary circuit resistance. As there are a limited number of steps for acceleration and speed control, there is considerable torque variation between control points when accelerating or making speed adjustments.

At top speed such a drive would have in the order of ½ per cent speed variation between three-quarter and full load, and at one-half top speed, a variation of 12½ per cent for the same load change. In many applications the 12½ per cent speed variation could not be tolerated.

This type of drive is suitable for application to small winders with moderate top productive speeds, to some waxing, pasting, and coating machine lineshafts requiring only a limited operating speed range. The drive is available in all capacities as required by the industry.

The constant voltage shunt wound d-c. motor drive arranged for adjustable speed by shunt field control consists of a d-c. motor with main circuit control and speed adjusting shunt field rheostat. The drive requires a d-c. power supply. As the speed adjustments are independent of the bus voltage, the same power supply may serve one or more drives up to the limit of the capacity of the power supplying d-c. generator.

The usual functions of starting and stopping are obtained by control of the armature circuit. The motor is provided with suitable starting resistance to limit and control the torque developed during acceleration. The control may be either full magnetic or manually operated. When magnetic equipment is specified it may be arranged for automatic operation from a pilot switch or for manual operation from a pushbutton station. The speed adjustments are obtained by a rheostat in the motor shunt field circuit. This rheostat may be either manual or motor operated. A motor operated rheostat is specified when full automatic control is required.

The control is ordinarily interlocked so that it provides full motor excitation on starting and thus limits the starting current to a minimum value. With this drive rapid deceleration can be obtained by dynamic braking. In applying dynamic braking, the motor armature is disconnected from the power supply bus and is shorted on itself through suitable dynamic braking resistor by means of a contactor.

Motors of this type are limited to approximately 4 to 1 speed range by shunt field control. They are capable of developing approximately constant horsepower over the operating speed range.

The operating efficiency of such a drive is good over the entire speed range obtained by shunt field control. On a constant torque application the motor losses decrease with reduced operating speed, and

Amsco Alloy—an Effective Weapon in Fighting Heat and Corrosion . . .

Pulp and paper mills will never be at peace with corrosion and high temperatures, which will attack their equipment, slowly or rapidly, but ceaselessly—shortening the life of parts which cannot take it and necessitating frequent replacements, often at the most inconvenient times.

But in sulfite digester practice you can have the best of this conflict by specifying for the parts exposed to corrosion and high temperature the chromium-nickel alloy which has proved its ability to resist these factors for long periods.

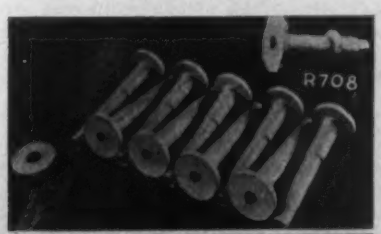
Amsco Alloy is the product of many years of exhaustive research toward the development of a metal with best resistance to corrosion and high temperatures. It is made in a number of grades to meet specific operating conditions.

Amsco Alloy F-12—the paper mills' own alloy—conforms to T.A.P.P.I. specifications, and has proved remarkably long-lived in sulfite digester service. Beyond heat and corrosion resistance it also has ductility to reduce the incidence of fracture from load carrying, compression and other stresses. It is moderately priced, can be readily machined, and is available in castings suitable for all digester requirements.

For further information, write for Bulletin No. 108.

If you need castings which must withstand impact and abrasion, ask for data on Amsco manganese steel, "the toughest steel known."

R-516 Blow valve bodies.
R-708 Steam nozzles.
R-538 Valve discs.



Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO., OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

Brake Shoe

SAIGON, INDO-CHINA

Half Way Around the World

Looking south across the China Sea toward Singapore stands the city of Saigon, Indo-China. There also, half way around the world, you will find Layne Wells and Pumps producing millions of gallons of water daily.

Layne Wells and Pumps are in operation in all parts of the world. Their skillful design, sturdy construction and amazingly long life features are known to engineers everywhere. Facing a world of the keenest competition, Layne Wells and Pumps have long been rated as the finest that skill and experience can build.

Primarily designed and built for peacetime work, Layne Wells and Pumps, under rigorous war-time overload conditions, are today making a magnificent record. Failures are almost unknown—a splendid tribute to the company's slogan of "Better Built for Better Service."

Production is now nearly 100 percent for the war effort, but every effort is being made to keep private and municipal installations in operation. For literature, address,

LAYNE & BOWLER, INC.
Memphis, Tenn.

LAYNE
PUMPS & WELL WATER SYSTEMS

Affiliated Companies

Layne-Arkansas Company.....Stuttgart, Ark.
Layne-Atlantic Company.....Norfolk, Va.
Layne-Bowler New England Corp....Boston, Mass.
Layne-Central Company.....Memphis, Tenn.
Layne-Northern Company.....Mishawaka, Ind.
Layne-Louisiana Company.....Lake Charles, La.
Louisiana Well Company.....Monroe, La.
Layne-New York Company.....New York City
Layne-Northwest Company.....Milwaukee, Wis.
Layne-Ohio Company.....Columbus, Ohio
Layne-Texas Company.....Houston, Texas
Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn.....Minneapolis, Minn.
International Water Supply, Ltd...London, Ont.

therefore the operating efficiency at these reduced speeds is much higher than can be obtained with the wound rotor induction motor drive.

This type of drive is available in all capacities as required by the industry and is suitable for application to rotary cutters, rewinders with moderate top productive speed limits, and to lineshaft driven processing machines such as waxing, pasting, and coating.

The adjustable voltage d-c. system consists of a shunt wound separately excited d-c. motor, a shunt wound separately excited d-c. generator, the necessary control for both the armature and field circuits of these units, and an exciter for supplying excitation to the motor, generator, and control.

Speed adjustments are obtained by a combination of generator voltage and motor shunt field control. With this system extremely wide speed ranges are possible with reasonably good speed regulation over the range. For example, if the motor is operated over a 4 to 1 speed range by shunt field control and the generator over a 10 to 1 voltage range, the combination provides a total speed range of 40 to 1. A speed range of this magnitude represents the maximum requirements of the industry.

With this adjustable speed system the d-c. generator may be driven at a constant speed, forming part of a motor generator set as with the conventional sectional paper machine or single motor paper machine lineshaft drive, or it may be driven over an operating speed range by some part of the processing machine and serve as a synchronizing generator as for example with the wet-end auxiliary or the core type reel drive.

The generator may be selected to serve more than one motor provided all motors are required to operate over a similar speed range. This arrangement is used with the various forms of sectional drives for paper forming or processing machines. When operated in this manner each individual motor may be adjusted independently by either automatic or manual control of its shunt field excitation. On sectional paper machine drives accurate speed matching between the adjacent sections is obtained by the use of fully automatic differential speed regulators controlling the shunt field excitation of the individual section motors.

Where speed regulation is of major importance, as on all paper or board forming machines, or where it is necessary to maintain a uniform threading speed, as on high speed supercalenders, where the range between maximum productive speed and threading speed may be as high as 40 to 1, it is possible to supplement these drives with speed regulating equipment of various types. The Rototrol, a simplified and reliable regulator utilizing standard exciter construction, is well adapted to this service. The Rototrol has been applied to drives for paper machines, supercalenders, wet-end auxiliaries, and to core type reels, where in every instance it is performing with a high degree of success.

The adjustable-voltage, direct-current drive with its many possible modifications is suitable for application to the individual sections of paper forming or processing machines or to the lineshaft drives of these machines, to high speed winders, to supercalenders, and to core type reels. This type of drive is available in all capacities as required by the industry.

For years an effort has been made to eliminate the exciter from the adjustable voltage d-c. drive, particularly on equipment of small capacity where the cost of the exciter represents an appreciable part of the total. This has been accomplished with the recently developed d-c. series adjustable-voltage drive. With this drive the exciter is eliminated by using a series-wound d-c. motor and generator and operating the control from the a-c. circuit.

With the standard arrangement of control the d-c. generator and motor are permanently inter-connected, and the equipment is started and stopped by starting and stopping the motor-generator set. On starting, the equipment accelerates to a speed as determined by the setting of the speed adjusting rheostat. On stopping, the motor of the motor generator set is disconnected from the power supply, and the equipment is allowed to drift to rest. If rapid deceleration is required the control may be modified to provide this feature by adding dynamic braking resistance and a main circuit and dynamic braking contact.

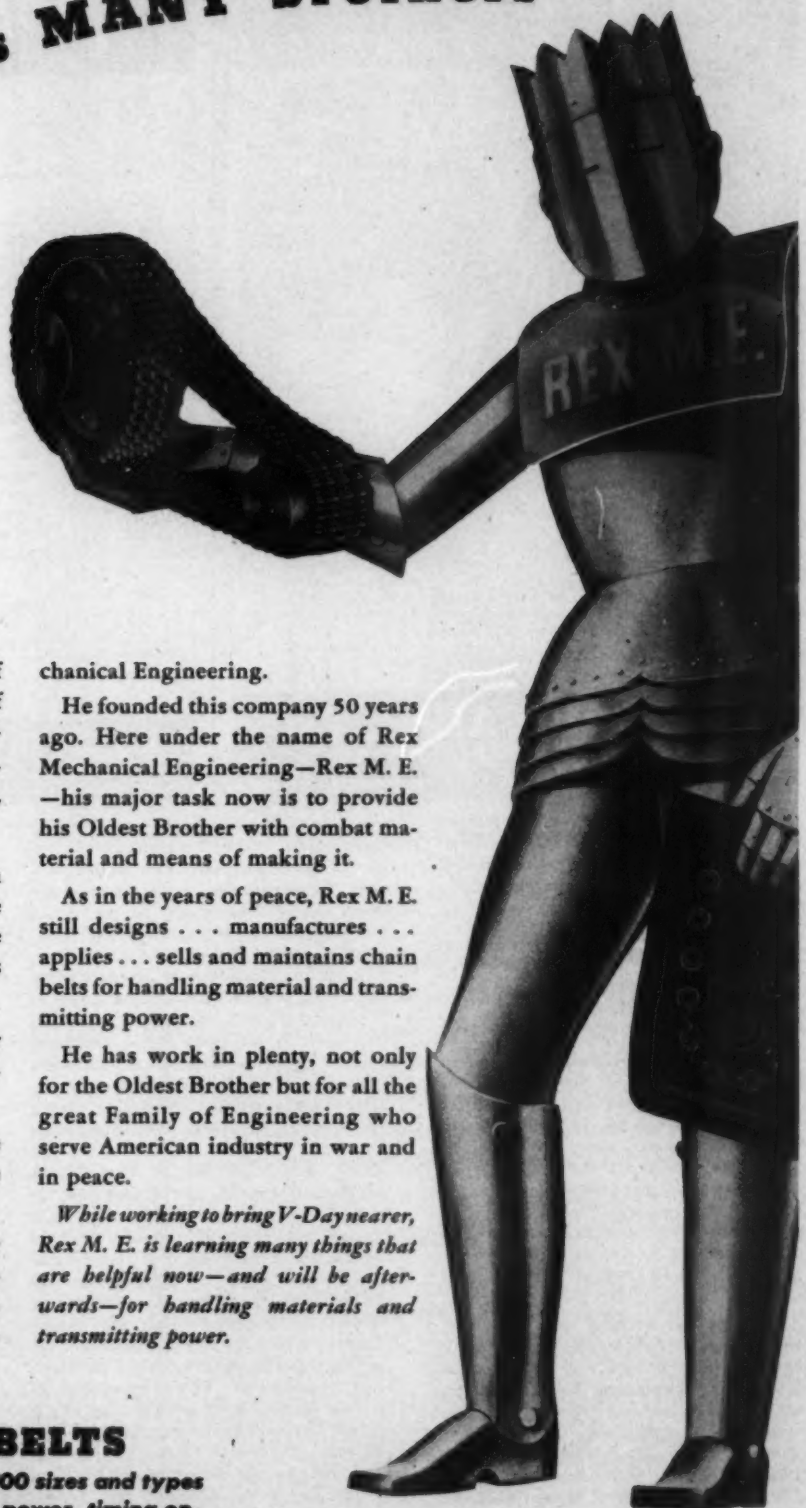
In view of the fact that the generator voltage is dependent on the load current, this type of drive is not particularly suitable for multiple motor operation. The equipment is available in capacities up to 15 hp. and for an operating speed range of 10 to 1. The speed regulation, particularly from 25 per cent to full load is fairly good and suitable for such applications as rotary cutters and paper processing drives such as waxing and coating machines.

The d-c. adjustable-voltage drive utilizing an electronic power rectifier is similar in principle to the adjustable voltage d-c. drive except that the motor-generator set and exciter are replaced with electronic rectifiers. The equipment consists of the conventional shunt wound separately excited d-c. motor, auxiliary control, and the electronic rectifier which serves both as a power rectifier and as a motor controller. With this drive speed adjustments are obtained by a combination of armature voltage and motor shunt field control. The equipment may be arranged to provide start, stop, speed adjustment and dynamic braking operations from pushbutton station. It is also designed to provide current limit acceleration to a preset speed adjustment.

This equipment is at present available in capacities up to 5 hp. and provides for adjustable speed operation over a 20 to 1 range, with satisfactory speed regulation to meet the requirements of drives for paper processing equipment. Ordinarily this drive will be specified only in such instances where it is advantageous to eliminate the motor generator set as required with the conventional adjustable-voltage, d-c. drive.

Although the requirements of adjustable speed drive in the paper industry are numerous and varied, there is available among the many types of adjustable speed electric drives, one which ideally meets the requirements. A careful study by the application engineer of the particular machine require-

He helps his MANY brothers



HE BELONGS to a large family of wonder workers. They are men of faith who perceive not only the difficulties, but ways to surmount them.

The Oldest Brother of the family is more than 5000 years old.

His business is to destroy—from as far off as he can, as swiftly as he can, while keeping his own as safe as he can. His inventions are marvels of speed and might.

He is now more active than ever before. His name is Military Engineering.

A Younger Brother works on the machines of destruction and in the factories that make them.

He is a youngster, something over a century old. He built the steam engine, machine tools, the internal combustion engine. His name is Mechanical Engineering.

He founded this company 50 years ago. Here under the name of Rex Mechanical Engineering—Rex M. E. —his major task now is to provide his Oldest Brother with combat material and means of making it.

As in the years of peace, Rex M. E. still designs . . . manufactures . . . applies . . . sells and maintains chain belts for handling material and transmitting power.

He has work in plenty, not only for the Oldest Brother but for all the great Family of Engineering who serve American industry in war and in peace.

While working to bring V-Day nearer, Rex M. E. is learning many things that are helpful now—and will be afterwards—for handling materials and transmitting power.

REX **CHAIN BELTS**

In more than 2000 sizes and types for transmitting power, timing operations, and handling materials

CHAIN BELT COMPANY OF MILWAUKEE

Safeguard the Life-lines of your Production!
OPERATING PARTS PROTECTED NOT TOUCHED BY FLOW
WEIR AND DIAPHRAGM FORM A POSITIVE LEAK-PROOF CLOSURE
HILLS-McCANNA SAUNDERS PATENT DIAPHRAGM VALVES

In pulp and paper mills, so much depends on the unhampered flow of stock, alum solutions, hypochlorite, chlorine water, liquors, caustics, etc., that you just cannot afford to put up with valve failures, clogging and corrosion—little demons that cause untold delays and interruptions, loss of time and production.

The unique Hills-McCanna Saunders Valve, has a resilient diaphragm which isolates the valve mechanism from the fluid—prevents wear and corrosion of parts—keeps the fluid uncontaminated. Diaphragm hugs valve seat—gives absolutely tight shut off—no leaks or wire drawing. Low overall cost—practically no maintenance—no packing. Free-flow without obstructions—reduces friction—maintains pressures.

Write today for Bulletin V-41.

HILLS-McCANNA CO.
2411 NELSON STREET, CHICAGO
PROPORTIONING PUMPS • AIR & WATER VALVES • CHEMICAL VALVES
MARINE VALVES • FORCED FEED LUBRICATORS • DOWMETAL CASTINGS

SINCE 1828

We have served the industry well, with the finest in Paper Mill Machinery.

NOW

our entire manufacturing facilities are engaged in turning out material for the mightiest and most formidable fighting machine our country has ever known.
While we cannot give you typical peacetime SW Service, we can supply you with replacements — under proper priority rating, of course.

THE SMITH & WINCHESTER
Manufacturing Company
SOUTH WINDHAM • CONNECTICUT

ments as well as the features of the available drives will permit selection of the most suitable motor drive for each application.

The Photochemical Stability of Papers

HERBERT F. LAUNER[1] and WILLIAM K. WILSON[1]

This investigation was undertaken as a part of the general program of research at the National Bureau of Standards for the preservation of records, and deals with the factors influencing the light stability of white record papers, not only as regards atmospheric conditions but also with respect to paper components. A third phase of the subject, namely, the relative deterioration occurring at various wavelengths of the spectrum to which papers are ordinarily exposed, is still in the process of investigation.

A commercial arc lamp with ½-in. electrodes of solid carbon, enclosed in Pyrex, operating at 2080 watts and 16.5 amp. was used in all experiments. The flame of the arc was 15.8 cm. from the center of the sheet during irradiation. In combination with this lamp, a liquid filter (Herbert F. Launer, "Apparatus for the Study of the Photo-Chemistry of Sheet Materials," *J. Research NBS* 24: 567, 1940, *R. P.* 1300) consisting of a glass cell made up of one sheet of Corex-D glass and one sheet of ordinary window glass, and through which was pumped a 0.117 molar solution of cupric chloride to remove the infrared, was used. The radiant energy thus reaching the papers consisted essentially of the strong cyanogen band at 389 mμ (W. W. Coblentz, M. J. Corcas, and C. W. Hughes, "Radiometric Measurements of the Carbon Arc and Other Light Sources Used in Phototherapy," *B. S. Sci. Papers*, No. 539 21: 549, 1926) superposed on a black-body continuum arising from the incandescent positive electrode, and did not include any radiant energy having a wavelength shorter than approximately 330, nor longer than 750 mμ.

The spectral distribution of this light and that of the sky light (eastern sky at 2:15 p. m. on a clear day, April 23, 1942) entering the laboratory through windows was studied by the method of transmission through glass filters having sharp cut-offs and known spectral transmission curves. A two-photocell balanced circuit with potentiometer (for the arc light, an automatic recording potentiometer) was used for measuring transmissions. It was found that 80 per cent of the filtered arc light lay in the region between approximately 330 and 440 mμ. Of the sky light, 25 per cent was found to lie in this region and less than 0.1 per cent in the infrared region beyond 750 mμ.

Inasmuch as the light usually affecting papers is in the region* between approximately 330 and 440 mμ, and since the filtered arc light included neither the shorter ultraviolet nor infrared, it is probable that the light used in this work differed from normal lighting, in its effect upon papers, mainly in intensity.

The remainder of the apparatus and its effectiveness were previously described in detail by Launer (Herbert F. Launer, "Apparatus for the Study of the Photo-Chemistry of Sheet Materials," *J. Research NBS* 24: 567, 1940 *R. P.* 1300). Principal emphasis was placed on control of the temperature of the paper during irradiation. The temperature of the sheets was maintained near 30 C. by intimate contact, through suction with a thermostated aluminum backing, supplemented by the removal of most of the undesired infrared. The air which continually flowed through the sheets during irradiation was kept at constant moisture content corresponding to a relative humidity of 58 per cent at 30 C. For experiments in which moisture was practically excluded, the air was dried to a relative humidity not higher than 0.015 per cent by continuous circulation over anhydrous magnesium perchlorate. For experiments in which oxygen was practically excluded, dry nitrogen was continuously circulated over copper gauze at 500 C., giving a content of O_2 of less than 0.03 per cent. For one experiment the content of O_2 was probably much lower than this figure, because a small glass irradiation chamber was substituted for the usual large one to reduce leakage of O_2 into the system by diffusion.

These were the usual conditions of irradiation. In a few comparison experiments the cupric chloride cell and paper thermostating arrangement were omitted. The distance from the arc to the sheet was changed

(1) National Bureau of Standards, Department of Commerce. Unpublished findings of the present writers.

FOR VICTORY
BUY
UNITED STATES
WAR
BONDS
AND
STAMPS

This Was the Art of Paper Making

Sheet by sheet the early paper maker produced paper. To remove water from the sheets, he placed them between felt layers and pressed out the water. He was interested in making one perfect sheet at a time. His was an art—the beginning of an industry that today produces tons of paper instead of sheets. But felts remain as part of paper making equipment, progressing with the industry — ever keeping pace with production methods. Since 1890 Appleton Felts have kept pace with paper making. That's why they are today preferred by mills everywhere.

makes APPLETON FELTS good paper

This advertisement is a continuation of a series started in 1940 depicting early history of paper making.

Appleton Woolen Mills

APPLETON • WISCONSIN

in certain experiments. Papers were usually irradiated on one side of the sheet, although in many experiments both sides were irradiated.

Thirty-one representative white, undyed book and writing papers produced in the semicommercial paper mill at the National Bureau of Standards from a variety of commercial materials were used for study. One commercial newsprint paper was also included in the study. This paper may be considered as representative of highly-lignified papers in general, and was very useful because of the large chemical changes caused in it by relatively mild exposures to light. Some very old commercial papers were used in a few experiments.

In the present investigation it was found that all the papers, excepting one containing appreciable quantities of lignin bleached when irradiated in air when the temperature was maintained near 30 C. during irradiation, but all of them yellowed during irradiation when the temperature was not controlled.

The two competing processes, bleaching and yellowing, are thus shown to have occurred simultaneously, the net observable effect indicating whether light or heat changes predominated. Thus, if a white paper turns yellow when irradiated, it may be inferred that reactions, other than photochemical ones have played the dominant role.

These remarks do not apply to papers containing appreciable quantities of lignin, for this material caused yellowing of paper even in the absence of heat effects. Extensive yellowing occurred in newsprint when irradiated under the usual conditions at 30 C. in air. This yellowing resulted from the lignin and was obviously different from the yellowing of cotton fibers containing no lignin, or the yellowing of delignified wood fibers. When, however, the yellowing due to lignin was prevented by lack of oxygen, the cellulose fibers in newsprint were bleached by light.

It was found that mild heating yellowed all of the types of papers, especially those that had been bleached previously by light.

The yellowing effect of heat was found to be large if the paper was previously (or concurrently) irradiated, especially if the irradiation took place in the absence of water vapor.

Thus, papers which are irradiated with strong light sources, including sunlight, without effective temperature control of the sheet, yellow owing to heat, assisted by the desiccation caused by the heat prevailing in the sheet during irradiation.

Water vapor and oxygen were found to play an important part in the bleaching of paper by light.

The bleaching effect of light was observed also in the case of papers yellowed with relatively great age or scorched at high temperatures. This effect may have practical significance for documents discolored by age or heat; bleaching may greatly heighten the contrast and permit more legible photographs to be made. This method of bleaching, of course, has the drawback that the light concurrently causes deterioration of the cellulose.

Only the light absorbed by a sheet of paper can cause deterioration.

Papers having high absorption values, newsprint and soda-sulphite papers, deteriorated more than those having lower absorptions, new rag, old rag, and refined sulphite papers. It is probable, however, that the fiber components were responsible for the difference in light stability, and that the absorption was only incidentally greater, although the two factors may have operated simultaneously. The condition of the fiber is obviously important, since the old rag papers were, in general, less stable than the new rag papers.

Other factors, such as content of lignin, rosin and acid, are more important than extent of absorption, in determining paper deterioration.

Certain fillers changed the absorptions of the rag papers with but slight effects on light stability. The darkening of newsprint by addition of $NaHCO_3$ increased the absorption.

Certain dyes present in very small amounts are capable of transferring the absorbed radiant energy to some types of fibers in such manner as to cause deterioration.

The light stability of paper was found to be very materially increased by a lack of oxygen in the surrounding atmosphere. All chemical changes during irradiation were found to be smaller in purified nitrogen than in air.

The light stability of papers irradiated in extremely dry air (containing less than 0.0007 per cent of gaseous water by volume) showed fundamental difference between papers derived from wood and those derived from cotton. Lack of water vapor caused smaller changes in alpha-cellulose for the wood pulp papers, but larger changes for the papers derived from cotton, than resulted from light under normal conditions of moisture. Acidity of all types of papers was increased by irradiation in dry air.

The extensive deterioration by light of newsprint paper probably arises from the photochemical reactivity of lignin.

The light stability of newsprint is very materially increased by buffering the sheet at $pH = 7.2$.

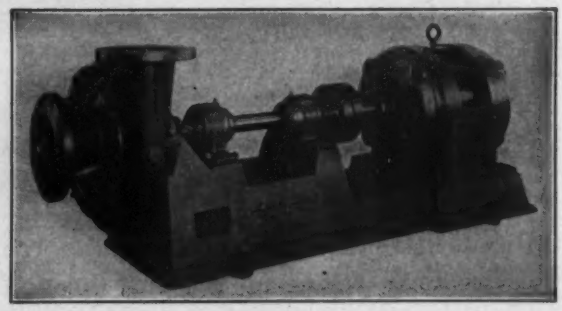
The resinous material in newsprint apparently did not affect the light stability appreciably. It was found that a sheet which had been extracted with ethyl alcohol, benzene and ether before irradiation showed no improvement in light stability.

The effect of moisture upon the light deterioration of highly lignified papers is moderate.

Rosin in the amount and manner in which it is usually introduced into paper by flocculation with aluminum sulphate was found to be an unimportant factor in the deterioration of paper by light unless the acidity is injuriously high. At low acidities, even for new rag papers, relatively large amounts of rosin had little or no effect.

Rosin, when added to sheets of paper by brushing with solutions of rosin in absolute alcohol, increased the deteriorating effect of light as much as or, in some instances, even more than sulphuric acid. The original light stabilities of papers made from new cotton fibers or refined wood fibers

Are Your **PUMPING COSTS** *Too High?*



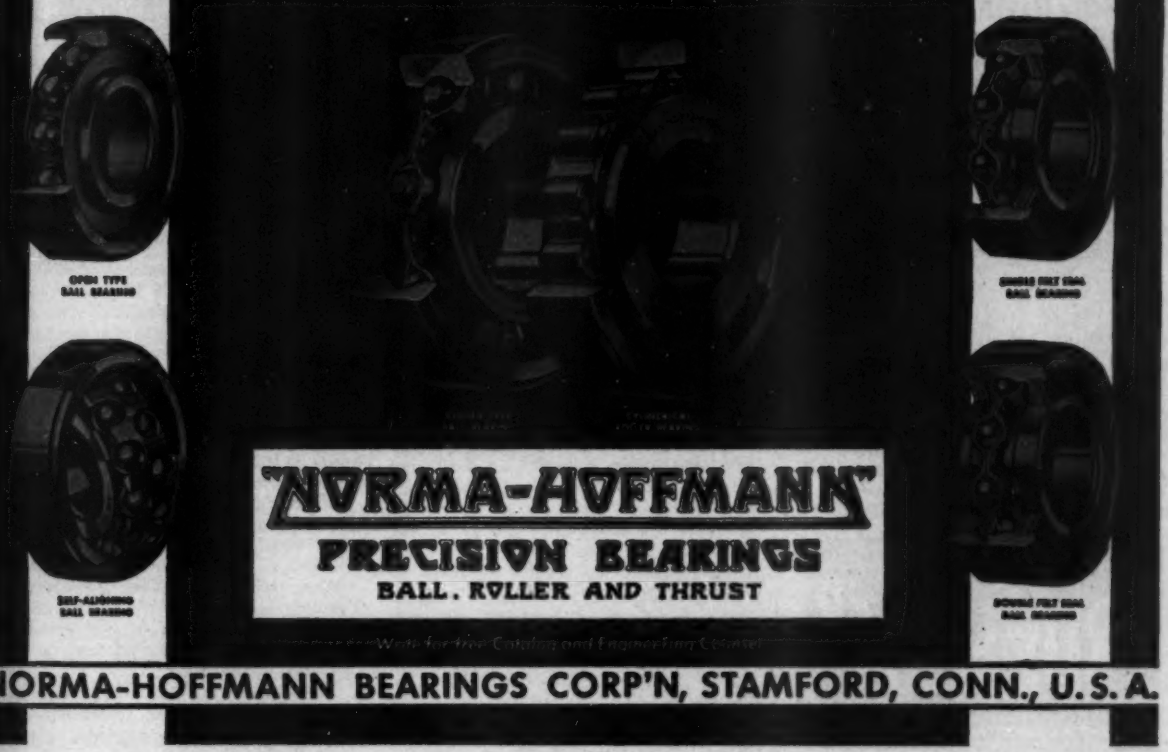
Why not let us—working with your own engineers—make a check-up. You'll incur no obligation—and the findings may surprise you. As specialists in pumping problems, with three-quarters-of-a-century of experience, we will gladly work with you thus—and may be able to point the way to substantial savings—either by means of new pumps, or by modifying your present equipment.

The cost of a PUMP is an investment in service. The cost of PUMPING is a continuing expense. A LAWRENCE CENTRIFUGAL built to meet your specific operating conditions will cost no more, but will yield you continuing returns in lower pumping costs. Whatever the material or duty, there's a LAWRENCE PUMP that will do the job at less cost. We'll be glad to discuss YOUR job with you.

LAWRENCE MACHINE AND PUMP CORPORATION
367 Market Street LAWRENCE, MASSACHUSETTS

LAWRENCE SINCE 1862
CENTRIFUGAL PUMPS

FOR MAXIMUM QUIETNESS AND ENDURANCE



"NORMA-HOFFMANN"

PRECISION BEARINGS

BALL, ROLLER AND THRUST

Write for free Catalog and Engineering Counsel

NORMA-HOFFMANN BEARINGS CORP'N, STAMFORD, CONN., U.S.A.

BUY WAR BONDS

KALAMAZOO

TANKS

. . . are built by men who have had years of experience with the problems of America's leading paper mills. Write for the complete details of how Kalamazoo Tanks save time and labor costs.

KALAMAZOO TANK & SILO CO.

KALAMAZOO MICHIGAN

PQ SILICATE AID

Improve Strength . . .

If you need higher "pop" test, investigate how the proper use of PQ Silicate in the beater helps to attain it.

A mill owner using silicate for 30 years says: "...the percentage of pop-test readings to basis weight is considered to be increased by an average of five points.....Occasionally a paper may run too low in strength and an increase of silicate alone in the furnish will raise the test one or two pounds or even more."

We'd like to send you more information on this and other advantages of PQ Silicate in the paper beater.

PQ SILICATES OF SODA

Philadelphia Quartz Company, Manufacturer
125 South Third Street, Philadelphia, Pa.
Distributors' Stocks in 65 Cities

GRUENDLER CRAFTSMANSHIP
Employed by U.S.A. in the WAR EFFORT

For a Better Refined PULP

GRUENDLER "TURBO" REFINER

Saves on power up to 30%

Actually Separates, Hydrates, and Combs Fibres—No disintegration and shortening of Fibres with this new method

Let us send you our Laboratory Reports and Bulletin

GRUENDLER

GRUENDLER CRUSHER & PULVERIZER CO.

● *We offer safe, economical solutions to all pulp and paper mill drainage problems with our twill weave, plain weave, sewed seam, and soldered seam wires.*

INTERNATIONAL WIRE WORKS

MENASHA, WISCONSIN

were greatly lessened by rosin thus added, whereas the stability of the ordinary wood fibers was not greatly affected.

The effect of glue upon the light stability of paper appears to be small if it existed at all. No effect of starch was found.

The sizing materials themselves were physically and chemically affected by light. The water resistance of sized papers was found to decrease during irradiation. A rosin, a glue and a starch-sized paper were each found to have lost over one-half of their sizing values (in terms of time of penetration of water using the dry indicator method) during the 17-hour period of irradiation.

Analyses for glue and starch before and after irradiation showed decreases of 5 to 10 per cent of the amount of sizing material originally present.

Paper is extensively protected by ink against the action of light.

The behavior of ink, which is principally on the surface of a sheet, is quite different from the behavior of a sensitizing dye. Although the ink absorbed almost all of the incident light, little or no transfer of photochemically active energy to the fibers occurred.

The increase in acidity occurring in paper during exposure to light suggests that a paper, once exposed to light, will no longer be as stable, even if stored in the dark, as the same paper had it not been so exposed. This was found to be the case.

The Flat Crush Test

PIERRE DREWSEN, Chemical Engineer
Hinde and Dauch Paper Co.

A recent proposal to incorporate a flat crush test in Rule 41 of the Consolidated Freight Classification as a measure of the quality of the corrugated medium has stimulated much thought and discussion about the merits of this test. This paper is offered as a progress report which gives some of the available facts and a discussion of some of the variables resulting from method variations.

One method of measuring flat crush test is the Hinde and Dauch Paper Company Tester which is described in complete detail in the *Paper Trade Journal* of March 10, 1938. Flat Crush Test may be defined as the measured minimum load per unit of area which, when applied perpendicularly to the surface of single or double face board, causes the corrugated arch to fail. However obtained, or in whatever units expressed it is an index number which measures the stiffness of the medium which keeps the outer and inner liners of a box in their original relative position.

No official method or test specification for flat crush test exists in the paperboard industry. A number of testing laboratories employ it, but if two of them have adopted the same procedure it was probably accidental. It is therefore somewhat confusing at times when industry men discuss the subject. The inclusion of flat crush test in Rule 41 would necessitate the adoption of an official test method. Before this can be done properly, the variables which affect the test, as performed in the laboratory, as well as those attributable to papermaking and combining factors should be thoroughly understood.

Among the probable laboratory variables are the following: whether the corrugations fail *regularly* by vertical compression or side roll; the moisture content of the samples at the time they are tested; the rate at which the crushing load is applied; the size of the sample selected for test; the kind of machine used for testing.

A series of tests in which all factors are unchanged except the variable under study indicated that the greatest variation in flat crush test depends on whether the corrugations fail by vertical compression or by rolling over sideways. The magnitude of this variation, as determined, appears to be around 35 per cent. The next greatest source of possible variation is that caused by the presence of moisture in the samples. The difference in results between those from samples conditioned at about 30 per cent relative humidity and those conditioned at 65 per cent relative humidity is on the order of about 25 per cent. A little difference in results was obtained by doubling the area of samples, and only a slight difference by halving the downward speed of the pressure platen. Some results were also obtained on an instrument made by adapting an inexpensive scale for rolling failure tests. It was found that the difference in results between this and previous tests was slight, but because insufficient samples were tested, no attempt was made to draw a conclusion.

The results of "first end point" and "final end point" were somewhat erratic, whereas the results of "rolling failure" were much more uniform and seemed to average within 5 per cent of "first end point" results.

Drying Rates of Newsprint—1942

W. G. MacNAUGHTON, Engineer
News Print Service Bureau

The present report is based on data compiled in a News Print Service Bureau study of the dryer section of newsprint machines covering 40 machines in 17 plants.

The speed of the machines ranges from 703 to 1,400 f.p.m. and the weight of water evaporated per hour per inch of width is from 72.3 pounds to 136.3 pounds, average 118.1 pounds.

The water evaporation rate calculated according to TAPPI method ranges from 1.52 to 2.76 pounds per hour per square foot of total heated dryer surface, the average being 2.072 pounds.

The temperature of the steam in the dryers ranges from 218 to 263 Fahr., and when the steam temperature is corrected to the average water evaporation rate the range is from 226 to 259 Fahr. with an average corrected temperature of 238 Fahr.

In this study, the viewpoint is that the pounds of water evaporated per hour per square foot of dryer surface is the direct result of (1) machine speed, (2) basis weight, (3) water to be evaporated per pound of paper dried or wetness of the sheet delivered by the presses to the dryer section, and inversely on (4) area of the drying surface provided—and not at all on the temperature of the steam.

On the other hand, as the amount of

Our 24 years' experience, plus the freedom of producing the best we know how without any handicap of "must" or "policy" or "tradition", enable us to produce a complete line of Score and Shear Cut Slitters and Winders that are modern in every detail, not merely modern in improvements. We'd like to send you more information.

JOHNSTONE
Engineering & Machine Co.
DOWNINGTOWN, PA.

Keep Bearings COOL with MOTOR MICA

★ Don't let stubborn lubricating problems tie up your machines. Bearings and other high frictional parts require better lubrication to assure COOL, NON-STOP operation. That is just what MOTOR MICA provides.

Try Motor Mica. We assure you it will solve your most difficult lubrication problem. Write for FREE sample.

Packed in 5-10-25-50-100 lb. Containers.

SCIENTIFIC LUBRICANTS CO.
Dept. "PI" • 3462 N. Clark St. • Chicago, Illinois

FOR 57 YEARS

BOWSER

PAPER MILL OILING SYSTEMS
Have been the Unanimous Choice
of The Paper Industry

S. F. BOWSER & COMPANY, Inc.
FORT WAYNE, INDIANA

WATERBURY FELTS

are made by

H. Waterbury & Sons Co.
Oriskany, New York

For Blow-Off Purposes and Services Where A Full Flow, Quick Opening Valve is Desired

SERVICE: Recommended for service on steam, water, oil, gas and chemical lines. Available for pressure of 250 lbs.

TYPES: Fairbanks Sphero Valves are regularly furnished with a semi-steel or chrome nickel alloy body and bonnet, with bronze, iron, or cast, steel ball, operated by a lever or worm and gear. Can also be supplied in cast steel with stainless steel ball and Ni-Resist steel rings.

FEATURES: Instead of the usual wedge or disc, Fairbanks Sphero Valves have a *revolving* Ball Plug which wipes seating surfaces clean. Its shearing action cuts through heavy solids and liquids. There is nothing on which foreign matter can accumulate. The opening in the Ball Plug is the same size as that in the pipe—there are no obstructions, no frictional resistance. Whether handling heavy viscous fluids or light gases, it has a leak-proof seal. Can be opened or closed with a quarter turn of handle. A positive stop tells when fully open or closed. There is any easy adjustment to take up wear.

Write for Catalog No. 42.

THE FAIRBANKS COMPANY
393 LAFAYETTE ST. NEW YORK, N. Y.
BOSTON, MASS. PITTSBURGH, PA.

water to be evaporated on a given machine is increased or decreased, it becomes necessary that the temperature and pressure of the steam to the dryers be similarly raised or lowered in order that the paper may be properly dried to the final uniform moisture content required.

As Cowan has stated in his theory of paper drying (*Technical Association Papers*, 1937) "In a given paper machine operating with a fixed number of dryer drums, any variation in speed must be met with changes in the temperature of the drums if the final dryness of the product is to be maintained the same. To effect this the steam pressure in the drums must be changed."

In other words, the more water there is to evaporate per hour per square foot of dryers, the higher must be the temperature (and pressure) of the steam to the dryers.

Other factors which are known or believed to influence the steam temperature are:

1) Degree of coating on the dryer surfaces.

2) Intimacy of contact of the paper to the dryers as indicated by the dryer felt tension.

3) Completeness and regularity of evacuation of the dryers of condensate and air.

4) Degree of ventilation of the dryer section for removal and absorption of water vapor.

The viewpoint presented in this report of the relation between steam temperature and water evaporation rate as well as the part played by the other factors is offered for the favorable consideration of the paper drying subcommittee.

The Resistance of Sized Paper and Paperboard to Water at Elevated Temperatures

PHILIP W. CODWISE, Chemical Engineer
The Beaver Wood Fibre Co., Ltd.

It is a well-known fact that the degree of resistance offered by the sizing in a sheet of paper to penetration of water decreases markedly as the temperature of the testing water is increased, but the exact nature of this relationship is not so well known. We are here presenting an investigation of these relations and believe that they will prove of interest, especially when their practical industrial applications are considered.

The test method employed utilizes water of ordinary purity as recommended by Carson (Carson, F. T. "Measurement of the Degree of Sizing of Paper," *Technologic Paper Natl. Bureau Standards* No. 326, Sept. 11, 1926) in his investigation of size testing methods. This is a flotation procedure.

A sample 4 by 4 inches is cut and prepared for flotation upon water, the temperature of which is carefully maintained at that specified. To prepare the sample, all four edges of the specimen are folded up at right angles for ½ inch and may conveniently be held in place with paper clips at the corners. This forms a small tray or boat which is gently placed on top of the testing water, taking care to avoid trapping airpockets, and timed with a stop watch. The elapsed time is taken when 90 per cent of the area has wet through and has turned dark in color, which can be accurately estimated with a little practice. The test is carried out with free evaporation from the uppermost surface. Tests are done with both the felt side and the wire side in contact with the water and may be reported separately or averaged as desired.

When carrying out boiling water test in control work, bring the water to a boil and then keep it just below a vigorous boil with the temperature averaging close to 212 Fahr. and not below 206 Fahr. It has been found that excellent check results can be obtained by taking an end point when most of the area—namely, 90 per cent has been discolored by wetting—because this eliminates the variable results, otherwise introduced by pinholes or other possible imperfections in the test specimen.

The results of flotation tests show that the change in transudation rate per degree Fahr. is considerably greater at ordinary room temperatures than it is at temperatures approaching the boiling point of water. In fact, in certain cases this change in rate may be five times the magnitude at lower temperatures than it is at the higher ones. This indicates a very real advantage in carrying out the tests at the more elevated temperatures.

It is entirely feasible to carry out sizing tests at temperatures up to 212 Fahr. upon papers internally sized with rosin size and alum, and after thus, to interpolate the results to determine what the transudation time would be when tested at any desired lower temperature even down to normal room conditions. One precaution might be mentioned here—i. e., with specialized methods of sizing the interpolation may be expected to vary to a certain extent and should be determined by practical tests.

There is a feature of this flotation test method which deserves special comment. This is its value in testing the harder sized paperboards.

The practical considerations in testing the sizing of paper and paper products at elevated temperatures are most interesting and may well furnish information which could not readily be obtained by other methods. This is especially true in uses where the sized product is subjected to water solutions at temperatures above normal. Examples of this are the use of the paper or paperboard as containers for warm liquids; their use with warm adhesives; and their use in industrial processes in which warm wet mixtures must be poured upon them. A good example of this latter is the manufacture of gypsum board products.

1) It is entirely practical to determine the degree of sizing of paper products at high temperatures up to the boiling point of water, by the flotation method, and by interpolation judge what the size resistance will be when exposed at lower temperatures.

2) This method which, when employed near the boiling point of water, is most useful in determining the overall or internal sizing of hard-sized paper and paperboard.

3) Small differences in temperature of the testing water are generally not as important at temperatures between 200 and 212 Fahr. as they are at ordinary room temperatures.

4) For all purposes requiring rapid results and where the product is to be exposed to penetration at elevated temperatures this method of test is of great practical value.

MISCO "C"
THE CORROSION RESISTANT ALLOY
CAST • ROLLED • FABRICATED
for all equipment exposed to corrosion by sulphite acids
MICHIGAN STEEL CASTING CO., DETROIT, MICH.

JONES-BERTRAMS
★ PATENT **BEATER**
E. D. JONES & SONS COMPANY, PITTSFIELD, MASS.

CHEMIPULP PROCESS INC.

CHEMICAL PULPING PROCESSES

Hot Acid Cooking and Recovery Systems
Chemipulp--K-C Digester Circulating Systems with Chip Distributor and Full Automatic Controls

●

Chemipulp--K-C Improved Acid Plants
Gas Fortifying High Acid Concentration

●

Digester Waste Liquor SO_2 Gas & Heat Recovery
Chip Pretreatment Preparatory to Cooking

●

500 Woolworth Building, WATERTOWN, N. Y. — **3311 First Avenue South, SEATTLE, WASH.**

- Associated with -

CHEMIPULP PROCESS LIMITED
403 Crescent Building, Montreal, P. Q.

Take A Look

9 Publications For Papermakers

Modern Pulp and Paper Making **$6.75**
G. S. Witham, Sr.
Second Edition, Revised and Enlarged. A book of 704 pages, written for machine tenders, beater men, and other practical mill workers, as well as for engineers, technologists and executives.

Trouble on the Paper Machine ..... **.75**
Archie McCaffery
A Monograph—published in convenient pocket-sized edition. Bulk rates, in groups of ten or more, 50 cents per copy.

Pulp Bleaching (A Symposium) ..... **.50**

Technology of Papermaking Fibers ..... **.50**

Spots and Specks in Paper ..... **.50**
Murray M. Rubin and Milton L. Rubin

Lessons in Paper Making—Part 1 ..... **.50**
Harry Williamson

Lessons in Paper Making—Part 2 ..... **.50**
Harry Williamson

Drying of Paper on the Machine **1.00**
B. M. Baxter

Procedure Handbook of Arc Welding Design and Practice **1.50**
Seventh Edition—latest information on all phases of arc welding—1308 pages—1810 illustrations. Standard text in hundreds of schools and colleges. ($2.00 outside U.S.)

Now available postpaid from

FRITZ PUBLICATIONS, INC.
59 E. Van Buren St., CHICAGO, ILL.

WATCH LOAD HOOK!

WRIGHT HOISTS are built to carry more than their rated capacities, but like other well-made pieces of mechanical equipment they should *not* be overloaded. Overloading is dangerous to men and imposes excessive strain on the hoist. Certainly, this is no time to take chances with either men or machines.

Watch the load hook. Wright load hooks are drop-forged from special steel which, when subjected to overloading, give visible warning by opening slowly. When the load hook has started to open, look to the top hook too, for while it is stronger than the bottom hook, it also may be reaching a danger point. When hooks show the effect of overloading, replace them immediately with new ones. Remember: repair parts are both easier and cheaper to get than a complete new hoist.

Send today for a free Crane Signal Chart. This chart (36" x 24") illustrates the various crane signals—and the use of the Wright system of crane signals will speed crane operation and promote safety. Write for your chart today.

WRIGHT MANUFACTURING DIVISION
York, Pa., Chicago, San Francisco, New York
AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT, CONNECTICUT

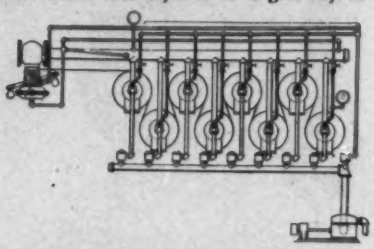
In Business for Your Safety

FLYING OVER THE WRIGHT YORK PLANT

NEW EQUIPMENT AND SUPPLIES

Steam Control System for Paper Machine Dryers

A steam control system, designated as the *All-Vac* (U. S. patent No. 2,098,462), for application to the dryers of paper machines has been announced by All-Vac Steam Control System, 205 West Wacker Drive, Chicago. According to the manufacturer, the system controls the steam both as it enters and leaves each dryer so as to give any de-



sired difference in pressure; and maintains an even temperature over the entire surface area of each dryer.

Incorporated in the piping layout of the system, in addition to a steam actuated diaphragm-operated pressure reducing valve, a vacuum pump (or series of flash tanks), and a thermostatic trap for each dryer, are three lines—a secondary control line, a differential control line, and a vent and equalizing line.

The secondary control line connects the high pressure side of the diaphragm of the pressure reducing valve with two points in the main steam header—one at the forward end immediately following the pressure reducing valve; the other, at the far end.

The vent or equalizing line connects the condensate return line of each dryer with the main condensate header. The connection in each condensate return line is effected through the steam joint while that in the main condensate header is made at a point immediately ahead of its entrance to the vacuum pump. A special thermostatic trap completes the connection between the vent line and the main condensate line.

The differential control line connects the low pressure side of the diaphragm of the pressure reducing valve with the vent line at a point near its discharge end.

The following claims are made for the system by the manufacturer:

1) A slight change in pressure from any or all points of control react immediately upon the pressure reducing valve, thus resulting in a very close balance of steam emission and condensate.

2) The vent pipe automatically eliminates non-condensable gases with the help of the special thermostatic trap.

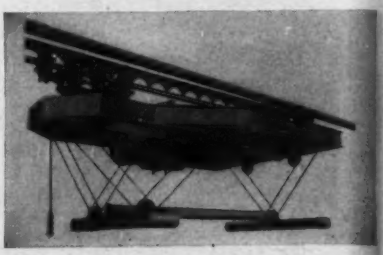
3) Pressure maintained in the supply lines and radiation is limited only by the vacuum the vacuum pump can maintain.

4) Flashing in condensate returns is prevented, and there will be no surging of condensate.

Stabilized Tramrail Carrier

The Cleveland Tramrail Division of The Cleveland Crane & Engineering Co., Wickcliffe, Ohio, has announced a tramrail carrier, which, by a simple patented arrangement of ropes to form a triangular suspension, eliminates longitudinal, lateral, and rotational sway. A load, even if considerably unbalanced, will be held rigidly in place by the carrier while being raised or lowered through a considerable distance. The carrier also permits the tilting of a load in either direction with relation to the rail on which the carrier is propelled.

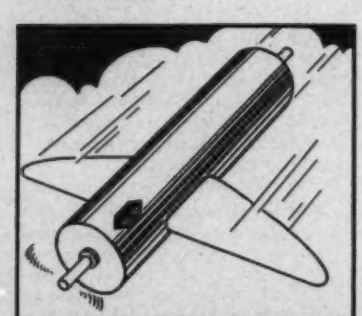
The carrier may be operated on two



standard Cleveland Tramrails, on a double girder Tramrail crane bridge, or on a regular type overhead Cleveland Tramrail rail on each side of which are provided parallel flat rails or I-beams for the support of stabilizing rollers attached to the carrier. The carrier either hand-propelled or electrically-propelled is built for various capacities and speeds to suit individual requirements.

Carton Stitcher

Acme Steel Co., 2840 Archer Ave., Chicago, has announced a carton stitcher, known as the *Seam Silverstitcher*, for sealing carton tops. Power driven, the machine can form and drive as many as 285 steel stitches per minute, drawing the necessary wire from a 10 lb. coil. The stitching



FAST DELIVERY ON "SHAF-TITE" ROLLS

FOR WET FELTS

plus patented features that give greater value.

Write for Catalog!

RODNEY HUNT MACHINE COMPANY

38 Maple Street, Orange, Mass., U.S.A.

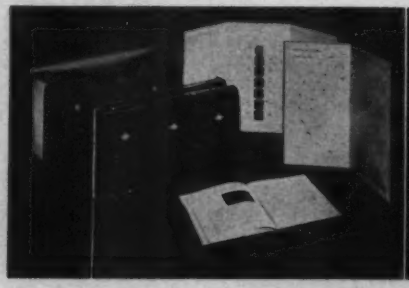
Color Matching Devices

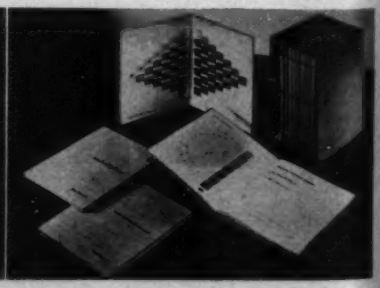
Container Corporation of America, Color Laboratories Division, 111 West Washington St., Chicago, has announced two devices for making color matches. Each device made up according to the Ostwald system of color identification uses symbols instead of names for the colors. One unit is in the form of a manual; the other, an index.

The manual, designated as the *Color Harmony Manual*, consists of 12 book charts. It provides 680 colors in the form of small cellulose acetate chips which have been sprayed with color. The chips are removable from the charts, thus allowing for easy comparison with paper samples.

The index, known as the *Color Harmony Index*, also provides 680 chips. These chips are 1 inch square; are visible in a series of 6 Bakelite indexes; and fit the usual photometric instruments. To obtain a given chip, it is necessary only to set an index pointer for the desired notation and to push a button to bring the chip into view.

The symbols may be communicated verbally or by wire. The colors are fade-proof and virtually indestructible. Both Manual and Index are accompanied by a concise text explaining the principles of color harmony.





Standard GOULDS PUMPS Meet Special KRAFT MILL Need

In a continuous causticizing process at the Container Corp. of America mill at Fernandina, Florida, 100% satisfactory service is assured by the two Goulds shown above. These Fig. 3158 three-inch centrifugal pumps of Ni-Resist construction handle 100 gallons of green liquor per minute at a temperature of 200° F.

The Goulds industrial line includes many other standard pumping units available for the specialized needs of the paper industry.

To help users make the correct choice, Goulds offers a portfolio of Pump Data Sheets. This is a comprehensive file of data, based on information formerly restricted to the use of salesmen. In it you will find pointers on installation, operation and maintenance, and also timely hints on conserving present equipment. A set of these sheets will be sent on request.

3812

Longcrimp Fourdrinier wire cloth, 30 times "up"

There can be no paper quality without wire cloth quality. The paper-forming process depends for its success upon the quality of the body mesh. Contributing factors are weave pattern, selvedge, seam, and the metal itself. It is on the bed of warp and shute knuckles pictured above that the slurry of interwoven fibres comes finally to rest.

Wire cloth today is tailored to the machine and the paper produced. Uniformity of mesh is paramount to paper excellence. At Lindsay, "uniformity" covers mesh opening, wire size, cloth thickness and firmness, knuckle height and shape, resistance to corrosion, abrasion and fatigue, and other points. We consider such many-sided uniformity a *fundamental* in filling your specifications.

THE LINDSAY WIRE WEAVING COMPANY
Serving the Paper Industry Since 1903
14001-14299 ASPINWALL AVE. • CLEVELAND, OHIO

SPEED
PRODUCTION
with
DARNELL
CASTERS

• Save Money, Floors, Equipment and Time by using DARNELL Casters and Wheels . . . Always dependable.

FREE
Manual

☆☆☆

DARNELL CORP LTD.
LONG BEACH CALIFORNIA
60 WALKER ST. NEW YORK N.Y.
36 N. CLINTON CHICAGO ILL.

A SAVING AT
EVERY TURN

mechanism is halted or put into operation by means of a solenoid control.

An overlap style container is suggested for use with the stitcher. A vertical roller guide and arrangement of the seam unit assure tight, positive closure for the carton.

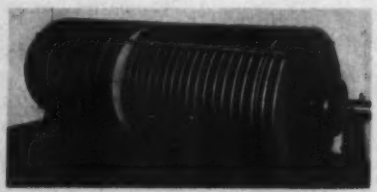
To complete the stitching operation, the carton flaps are slipped through the open head device. Since the table and vertical roller guide are adjustable, the machine can accommodate containers of varying depths and widths.

Commercial t-Butyl Hydroperoxide

Union Bay State Co., 50 Harvard St., Cambridge, Mass., has announced the availability of commercial *t*-butyl hydroperoxide. Standardized at a concentration of 50-60 per cent (10 per cent ± available oxygen), the product, according to the manufacturer, appears to be ideally adapted for use as a catalytic agent in one or two phase polymerizations; as an oxidation agent for laboratory purposes; as a drying accelerator in oils, paints, etc.; as a combustion accelerator in heavy fuel oils used in diesel engines; as a bleaching agent for certain fibrous materials; and for numerous other uses.

Rotary Clarification Filter

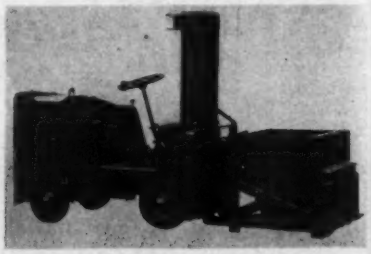
Swenson Evaporator Co., Division of Whiting Corp., Harvey, Ill., has announced a rotary leaf clarification filter incorporating in its design a sturdier leaf than heretofore developed. The leaf, according to the announcement, produces a uniform tautness of screen, giving longer screen life and eliminating customary clamping rings and bolts.



The element illustrated contains forty 44½-in. diameter leaves and will be used for the clarification of caustic solution.

Hopper Attachment for Lift Truck

Towmotor Corp., 1226 East 152nd St., Cleveland, has developed a hopper attachment for use with standard fork equipment. The hopper, made in various sizes (the unit illustrated having a capacity of 17½ cu. ft.), is carried directly on the fork support



bar of the lift truck by means of an integral hook arrangement. The bottom of the hopper slants toward the discharge gate. Opened by pulling down a hand lever, the gate is closed by gravity, and is secured by an automatic catch-latch.

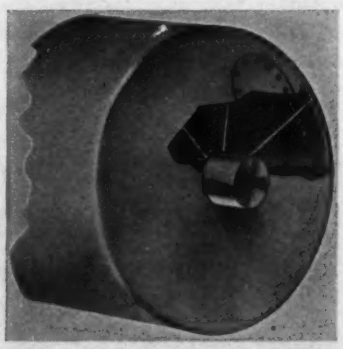
Screw Conveyor Trough

Link-Belt Co., Chicago, has announced the development of a screw conveyor trough with bottom of steel (no heavier than No. 10 gauge), and with sides and cover of

wood. The assembly, lag-screwed together to form a tight enclosure, is adapted to all standard screw conveyor fittings, and may be connected to an existing steel trough installation.

Adjustable Circular Screen Support

D. J. Murray Mfg. Co., Wausau, Wis., has announced an adjustable support for maintaining the tautness of the backing



wire, face wire, and winding wire of a circular screen. The support can be applied to either new or old cylinders. It is covered by a patent issued to John B. Nowak and assigned to the D. J. Murray Mfg. Co.

CHEMICALS BY GLYCO

FLAMEPROOFING AGENTS
WATERPROOFING AGENTS
AND OTHER SPECIALTIES FOR
THE PAPER INDUSTRY

★

Write for our catalogue
"Chemicals by Glyco"

GLYCO PRODUCTS COMPANY, INC.
238 KING ST., BROOKLYN, NEW YORK

AURAND

CLEANING TOOLS

ELECTRIC or PNEUMATIC
2 sizes of each

FOR ANY HARD SURFACE: IRON—STEEL—BRICK—CONCRETE—ETC.

EFFICIENT—Powered rotary chipping provides positive removal of foreign matter. Adjustable depth shoe prevents excessive chipping or damage to under surface.

ECONOMICAL—Replaces sand blasting and other expensive, tedious methods. No special skill required to use . . . cutter heads renewable . . . motor cannot become overloaded.

COMPACT—Portable, compact, usable in any position: horizontal, vertical, overhead. Always ready for immediate use. Weight only 7, 8, 15 or 21 pounds.

For further information write Dept. 649.

AURAND MFG. & EQUIP. CO.
2643 Colerain Avenue • CINCINNATI, OHIO

Special for
PAPER

PARIS 2
Black

A COLUMBIAN COLLOID

[illegible] exceptional tinting strength
[illegible] of Paris 2 Black permits use of a
[illegible] of pigment to obtain
desired results.

•

[illegible] rate of oiliness
[illegible] optimum particle size
[illegible] factorial strength
[illegible] loss of dispersion
[illegible] loss of bonding
[illegible] uniformity

•

Use [illegible] Paris 2 Black in your blue
[illegible] paper stocks with assurance
[illegible] IN SULPHITE PAPERS
[illegible] IN SULPHATE PAPERS
[illegible] IN SEMI-CHEMICAL PAPERS
[illegible] IN GROUNDWOOD PAPERS

We invite technical inquiry

BINNEY & SMITH CO. • COLUMBIAN CARBON CO.
DISTRIBUTOR
41 East 42nd St., New York, N. Y.

TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Critical Evaluation of Sulphite Waste Liquor in Tanning

The lignosulphonic acid derivatives obtained from waste liquor are discussed from the standpoint of their use as auxiliary agents in the vegetable tanning of heavy hides. While lignosulphonic acids show a marked affinity for proteins, and while a large part of the lignosulphonates combine irreversibly with the hide protein, the hydrothermal stability of the hide decreases with such treatment. The lack of tanning power does not appear to be due to the molecular dimensions of the sulphonic acids used, because the identical effects were noted both by high and low molecular fractions of the sulphonic acids. The lack of tanning ability appears due to some deficiency in the chemical constitution of the lignosulphonic acids. Despite this, the waste liquor is useful in admixture with vegetable tanning agents—as *p*H regulators, solutes, and as filling matter for heavy leather. Satisfactory leather cannot be produced, however, by simply using lignin wastes alone.

By examining various tanning materials with somewhat similar constitutions, the reasons for the lack of tanning power of the lignosulphonates was studied. The deficiency seems due to an insufficient number of phenolic hydroxyl groups with the right position in the large molecule. The author believes that if the structure of lignosulphonic acids could be so modified (by relatively simple chemical means) to give products having structures similar to those of the polyhydroxy-phenols (and certain of the vegetable tannins and synthetic tannins) sulphite waste liquor would become a potential raw material for tannins. At present that is not the case. K. H. Gustavson. Svensk Papperstidn. 44, 193 (1942); through B. I. P. C. 13, 39 (1942).

Cleaning of Metal Cloths

Alkalis (like hot caustic soda solutions) which might be used in cleaning metal cloths free from resins and other encrusting substances are quite slow in their action. Carbon tetrachloride, which does not affect lead, phosphor bronze, Monel metal, or tin, may attack iron, aluminum and copper. Dichloromethane behaves much like carbon tetrachloride but has the advantage of being miscible with alcohol, benzine, etc.

However, the chloro derivatives of ethane and ethylene do not attack the common metals like iron or copper. The most useful of these solvents is trichloroethylene. None of these reagents is inflammable, but they are toxic, and cannot be used in quantity without proper ventilation. They may act as anaesthetics, and this action may be followed by nausea. The author mentions a substance which, it is claimed, is free from these toxic effects, but the composition of which is not disclosed. It is termed Benzanul, has no acidic properties, is odorless, non-inflammable, gives rise to no deleterious vapors, and is a suitable solvent. E. Belani. Pappen-Holzstoff-Ztg 48 (in Kartonagen-Papierwaren-Ztg 45) No. 15, 124 (April 14, 1941) through Bull. Inst. Paper Chem. November, 1942.

Sulphite Waste Liquor Studies

Organic bases have been used for the differential separation of sulphonic acids contained in sulphite waste liquor and are used in their isolation. Tabulated data show the percentage of methoxyl removed by the fractions precipitated by various bases. In the isolation, sulphonic acids from birch are less completely precipitated than are those from spruce. The salts of the sulphonic acids differ in solubility with variations in cooking procedures. For example, liquors from cooks yielding "dissolving pulps" are precipitated more completely than are those obtained from strong pulps.

This Is One of Your Problems!

Good Piling is Good Safety
Block every bottom roll. Then when the front roll is taken away, the rest will not spread and cause the pile to come down.
Simple precautions often prevent serious accidents

But you have many more.

Do you know what they are?

Do you know how you can *solve* them?

Do you realize that for the sake of our War efforts, you *have* to solve them?

For a complimentary copy of our Memo No. PP-O, "The Principal Accident Problems in the Paper Industry," just write on your Company letterhead to:—

Paper and Pulp Section

NATIONAL SAFETY COUNCIL, INC.

20 North Wacker Drive **Chicago, Illinois**

RYERSON STEEL

IN STOCK FOR PROMPT SHIPMENT—
JUST CALL YOUR NEARBY RYERSON PLANT

Partial List of Ryerson Products:

Alloy Steels · Bars—Shapes · Structurals · Rails—Plates · Sheets—Strip · Shafting—Bolts · Stainless · Boiler Fittings · Reinforcing · Floor Plates · Tool Steel · Threaded Rods · Rivets—Nuts · Chain—Wire · Tubing

RYERTEX NON-METALLIC BEARINGS

Water, Oil or Grease lubricated. These bearings wear longer; reduce power consumption; save vital war metals. Use Ryertex for: Jordans, Beaters, Press and Couch Rolls, Grinders, Calenders, etc.

JOSEPH T. RYERSON & SON, INC.

CHICAGO · MILWAUKEE · ST. LOUIS · DETROIT · CLEVELAND · BUFFALO
BOSTON · CINCINNATI · PHILADELPHIA · JERSEY CITY

The following bases were found to be suitable in fractionating sulphonic acids: 4,4-bis (dimethylamino) diphenylmethane (I) which causes precipitation of nearly all the alphalignosulphonic acids that cannot be dialyzed, brucine and strychnine, which also precipitate acids of low molecular weight, and finally certain aminoacid amides. There appears to be a relationship between the molecular weight of the base and its precipitating power (quinoline and the biquinolines).

More complex bases are often better precipitating agents than are simpler ones (e.g. quinoline and betanapthoquinalidine). The addition of an excess of the sulphate of (I), in solution, to a sulphite waste liquor causes a precipitate, which may be decomposed with barium hydroxide and the barium salt (A) precipitated with alcohol. The mother liquor from the original precipitate is then also treated with barium hydroxide to remove (I) and thereupon treated with an excess of brucine sulphate. This precipitate from the mother liquors is then also converted to the barium salt (B). The final mother liquor is then precipitated with ethanol, after concentrating in vacuo. This is salt (C).

In general, (A) is free from carboxylic acid groups. On the other hand, (B) and (C) contain carboxyl groups as well as sulphonates, which, however, may not emanate from the lignin, but from sugars. Methods of purifying barium salts by conversion into lead salts, and subsequent reconversion into the barium salts are given.

There is however a simpler method for preparing (A), (B) and (C). In this the sulphite liquor is filtered through a hydrogen-saturated organolite (of the sulphonic acid type). This removes the calcium ions. The acid filtrate is then neutralized with (I), and the precipitate converted as above to the salt (A). The filtrate is treated with barium hydroxide, with subsequent organolite filtration, followed by neutralization with brucine. This finally yields (B) with barium hydroxide. (C) is obtained as above. The fractions here represent three portions made up solely of Ba salts. Other products are to be reported on in the future. H. Erdtman. Svensk Papperstidn. 45, 315 (1942); through B.I.P.C. October (1942) 79-80.

Binding Agents in Fiberboard

The introduction of synthetic resins as special binders in fiberboard manufacture has greatly increased the scope and usefulness of the boards. In Germany two types of boards are largely made, one of them adds no binder while the other (which in general shows a greatly increased mechanical strength) uses binders. Often the binding agent is added to the wet stock, especially during beating. Alfred Wilke. Holz, Roh u Werkstoff 5, 78-81 (1942).

Paper Yarn Manufacture

Wood pulp is used in all pulp and paper yarns. The pulp yarn termed "Zellulon" is spun from wet pulp which contains no added size or other chemicals but which has been beaten. The pulp suspension passing over a suitable cylinder mold takes the shape of thin ribbons, which are folded or rolled while they are still wet, and then twisted on spinning machines and dried when the fabrication is complete. On the other hand, the so-called "paper yarns" are cut into ribbons from a paper web which has been made from sized and beaten pulp. These are sometimes impregnated during the cutting operation, and are then folded, pressed, etc. Sometimes the spinning occurs together with jute, hemp, or flax thread (Textilit). The paper yarns are usually stiff and brittle and require conditioning if difficulties in spinning are to be avoided. Sliding off of spools or cones are among the troubles encountered. Storage is important. The moisture content may be as high as 15%. The highest uniformity in the color of paper yarns is obtained when they are dyed in the beater. Dyeing after twisting give rise to lighter and darker shades. R. Bauer. Papier-Ztg. 66, 31/2, 534 (April 19, 1941) through B. I. P. C. 13, 150 (1942).

PAPERMAKING PATENTS

IN THE UNITED STATES — Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington, D. C.

Method of Manufacturing Paper and/or Board

Patent No. 2,286,942. Alvin Tuten, Georgetown, S. C., assignor, by mesne assignments, to International Paper Company, New York, N. Y., a corporation of New York. Application July 11, 1939, Serial No. 283,755. 1 Claim. (Cl. 92—39). A method of making an interfelted cellulosic fibrous web on a fourdrinier machine having a traveling wire, a primary headbox and a secondary headbox each adapted to discharge stock in the direction of travel of the wire; which comprises laying down stock from said primary headbox on the moving fourdrinier wire, dehydrating said stock to form a base sheet to such a point as substantially to eliminate all floating fibers on the upper surface of said base sheet on the wire, then laying down a secondary cellulosic fibrous stock from said secondary headbox on top of said base sheet, drawing the fibers of the secondary stock into interlocking engagement with the stock forming the base sheet to form a composite interfelted sheet, regulating the static head effective on the primary and secondary headboxes to maintain a velocity of emergence of the stock from the primary headbox which is less than the lineal speed of the wire but which shall not have a ratio to the wire speed of less than 0.900 and to maintain a velocity of emergence of the stock from the secondary headbox which is less than the velocity of emergence of the stock from the primary headbox except where the emergence of the stock from the primary headbox is at its lower limit of 0.900 and in such case to maintain a ratio of velocity of emergence of stock from the secondary headbox to velocity of emergence of stock from the primary headbox of 1.00 and without permitting the ratio of the velocity of emergence of the stock from the secondary headbox to the speed of the wire to drop below 0.900.

Apparatus for Testing Color

Patent No. 2,287,322. Oscar E. Nelson, Tyrone, Pa., assignor to West Virginia Pulp and Paper Company, New York, N. Y., a corporation of Delaware. Application December 14, 1939, Serial No. 309,142. 1 Claim. (Cl. 250—41.5). In a device for measuring the reflection characteristics of a surface to be tested, and employing a photoelectric cell against which a beam of light from said surface is impinged, a thermionic amplifier for said cell and an indicating device actuated thereby, the improvement which consists in the combination with the foregoing of a light interrupting device in the path of said beam to said cell, said device consisting of a plurality of movable vanes and means for driving same, an apertured diaphragm coacting therewith whereby to periodically interrupt said light beam, said vanes and the aperture being so arranged that the shadows of said vanes cast upon said aperture are substantially equal in size and area to said aperture whereby a current of substantially 100% modulation and of substantially sine form is produced in said cell and of a frequency facilitating amplification of current by said amplifier.

Continuous Beater and Pulp Selector

Patent No. 2,289,612. Harold Donald Wells, Glens Falls, N. Y. Application April 16, 1941, Serial No. 388,878. 2 Claims. (Cl. 92—23). A paper-making-pulp beater and selector comprising a liquid and stock tank, a cylindrical pulp discharge screen disposed centrally of said tank and projecting upwardly from the tank bottom, said cylindrical screen having its axis disposed vertically and having its outer periphery directly exposed to the contents of said tank, a rotor over and in close proximity to said cylindrical screen and mounted on a vertical axis in concentric

WILL BE BACK—

AFTER WE BEAT THE AXIS

Until then all of our plant facilities are being used to make equipment needed by our fighting forces. Barking drums, screens, chip crushers, pulpwood chippers, wood cleaners—all paper mill and wood room equipment—withdraw from our production lines except where permission to make such equipment is granted by W.P.B. Necessities of war take their places. You'll agree with us that's the all-important job now. But, when all-out efforts triumph we shall be better able to meet your needs for new machinery and parts.

D. J. MURRAY MFG. CO.
WAUSAU, WISCONSIN

HARDY S. FERGUSON & COMPANY
CONSULTING ENGINEERS
200 FIFTH AVENUE NEW YORK CITY

Hardy S. Ferguson—Member A.S.C.E. A.S.M.E. E.I.C.
Moses H. Teare—Member A.S.C.E. A.S.M.E. E.I.C.

Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of

PULP AND PAPER MILLS AND OTHER INDUSTRIAL PLANTS
STEAM AND HYDRO-ELECTRIC POWER PLANTS
DAMS AND OTHER HYDRAULIC STRUCTURES

COLORS . . .
for Board and Paper

Green Chromium Oxides
Black, Brown, Red, Yellow Iron Oxides
Lamp Black—Umbers—Venetian Reds—Yellow Ochres

C. K. WILLIAMS & CO.
Easton, Pennsylvania

relation with said cylindrical screen, pitched blades secured to said rotor for beating the tank contents and centrifugally moving the same to produce an outward, upward, inward and downward circulation, and an arm secured to said rotor and projecting downwardly therefrom at the outer periphery of said screen, said arm serving to clean said screen and to radially pulsate the pulp immediately surrounding said screen, and means under said tank and communicating with the interior of said cylindrical screen for receiving the screened pulp discharging through said screen.

Method and Means for Coating Paper

Patent No. 2,267,470. Fred Kabela, Little Ferry, and George F. Whiting, Ridgefield, N. J., assignors to Lowe Paper Company, Ridgefield, N. J., a corporation of New Jersey. Application February 16, 1938. Serial No. 190,696. 2 Claims. (Cl. 91—55). The method of producing glossy-surfaced coatings on paper and similar sheet material which comprises applying a coating of gloss forming solution to a strip of the material, covering the coating while it is moist with a smooth dry surface of a band of preformed flexible foil material, pressing the coated material and said band of foil together to bring the moist coating into intimate contact with said foil surface, drying the coating while maintaining said contact and simultaneously causing the foil to be advanced at a slightly different speed than the coated material by passing the coated sheet material and foil along a partly curved drying path, and thereafter separating the coated material and said foil.

Apparatus for coating a continuous paper web to produce a smooth surface finish comprising, in combination, means for applying a wet coating to a face of the web, an elongated band of thin, freely flexible foil material having a smooth surface, means for continuously pressing the foil material against the coated face of the web to cause adhesion between the foil and web, the foil material being more flexible than the paper web and being conformable to variations in the surface of the wet coating, a plurality of heated rollers arranged out of alignment with each other, means for advancing the web while in contact with the foil against the surface of said rollers, the surfaces of said rollers being of such curvature as to cause a slight displacement of the foil with reference to the web while passing thereover, and means beyond said rollers for separating the foil from the paper web.

Press Roll for Paper-making Machines

Patent No. 2,288,675. Earl E. Berry, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Application May 29, 1939, Serial No. 276,377. 2 Claims. (Cl. 92—49). A press roll comprising a metal shell, a soft rubber covering for said shell, and a perforated relatively hard rubber covering over the soft rubber in bonded relation thereto, said hard rubber covering presenting a smooth web-receiving surface on said roll with a myriad of blind holes therein, said hard rubber covering being compressible to decrease the volumes of the holes when the covering is subjected to nip pressure.

Apparatus for Delivering Paper Stock to Paper Machines

Patent No. 2,281,293. Richard T. Lang, Heidenheim on the Brenz, Germany, assignor to American Voith Contact Co., Inc., New York, N. Y., a corporation of New York. Application December 15, 1937, Serial No. 179,881. In Germany December 19, 1936. 5 Claims. (Cl. 92—44). An apparatus for delivering stock to a high speed paper making machine, comprising a vertically disposed container having a lower and an upper portion, and having a stock inlet at said lower portion at the rear of the container and a stock outlet at its upper end, a stock supply pipe, for supplying stock to said inlet, a stock delivery nozzle for said outlet, said lower portion being formed with a curved wall, at the front of the container, disposed in line with and opposite to said inlet for deflecting the stock in an upward direction, and said upper portion having unimpeded communication with the lower portion and having substantially the same cross-sectional area throughout its length.

New Catalogues, Publications, and Ass'n Reports

Cochrane Corp., Philadelphia—A complete description of proportioning equipment of the double displacement type, which eliminates pumps, moving parts, etc., is given in Cochrane Bulletin No. 4009. This company has also published a bulletin on Cochrane deaerators, No. 3005. The latter bulletin contains information about the four different deaerators: the tray-type, atomizing, hot water, and cold water.

Hammermill Paper Co., Erie, Pa.—A recent publication of this company is called "Manual of Paper Information." This compact booklet is a time-saving reference book for buyers of paper and printing. It has been compiled for the purpose of assisting buyers of paper to observe WPB restrictions, and by consulting the specification tables, any buyer of Hammermill papers may figure his needs adequately and economically.

Crane Co., Chicago—"Piping Pointers" Bulletin No. 6 has recently been issued. It is one of a series of bulletins designed to help train the many thousands of new maintenance men needed in war industries to keep piping systems working. Bulletin No. 6 contains various helps in meeting piping material shortages, and a few examples of wartime piping ingenuity.

De Laval Steam Turbine Co., Trenton, N. J.—Worm gear units for 3 inch and 3½ inch center distances are described in leaflet E-1219 issued by De Laval. Specifications are given, as well as standard dimensions, of these gears, supplied for either top or bottom drive and in ratios from 3⅝ to 1 up to 60 to 1.

General Printing Ink Corp., New York City—A new folder issued by this organization entitled "Color Standards" presents a convenient check list of 34 color systems and color standards widely used in American industry and science. The data contained in it is valuable as a permanent record and most helpful for reference purposes. A copy of this brochure is available upon request.

D. W. Haering & Co., Inc., Chicago—This company has just published a 48-page booklet of articles on scale, corrosion, and water treatment problems reprinted from a selection of the most interesting and popular discussions to appear in the company's house organ. Profusely illustrated, the booklet provides important information including tables, charts, and graphs on water problems occurring in cooling systems, hot water systems, boilers, and return systems. In a convenient pocket size, the "H-O-H Water Studies" catalogue is available upon request.

International Nickel Co., New York City—A 16-page bulletin, just released by this company, is entitled "8 INCO Nickel Alloys for the Process Industries." It presents brief but comprehensive data on the 8 high-nickel alloys and their corrosion resistant uses in the many chemical process industries. The individualized service characteristics of the metals, their average mechanical properties, physical constants, and other pertinent data are presented in comparative tables and charts which give "at a glance" information. Copies available upon request.

Jeffrey Mfg. Co., Columbus, Ohio—Bulletin No. 769 of this company deals with portable stackers and conveyors for storage and warehouse service. Specifications and dimensions of the various types of stackers are given, as well as illustrations and other information.

S. C. Johnson & Son, Inc., Racine, Wis.—Johnson's wax-fortified paint is off the market for the duration of the war, since certain ingredients used in the manufacture of this line of paints are no longer available. A new booklet introduces a new paint—Johnson's war-formula paint—developed to replace the wax-fortified paint. The booklet contains detailed information on finishes, colors, and specifications of the new product. It also includes a handy color card.

Link-Belt Co., Chicago—The new 180-page, streamlined, condensed General Catalogue No. 850 of Standard Equipment has been announced by this company. Representative types and sizes of power transmission and materials handling equipment are included, and illustrated, preference being given to the more widely adaptable designs. Dimensions, weights, list prices, and other pertinent data are given on such items as chains, sprockets, silent and roller chain drives, etc. The catalogue is available from the company.

Lyon-Raymond Corp., Greene, N. Y.—This company's new Bulletin No. 131 covers the hydraulically operated Lyon welding positioner. It contains detailed information, specifications, and illustrations.

George S. May Co., Chicago—This company has developed an instrument called the "Shiftograph" for use as a perpetual work shift schedule. By simply turning a dial, the user can tell at a glance what shifts certain crews will work, the days they work, and their days off. This instrument provides for several different

Speedy Way to Sour Fourdrinier Wire

Here's an effective way to sour Fourdrinier wire that many mills follow today. Instead of raw acids, they use quick-acting Oakite Compound No. 32 which is far safer. Easily, thoroughly, it removes lime deposits without weakening or injuring copper or brass strands . . . so helping extend wire life.

FREE MANUAL Gives You Details

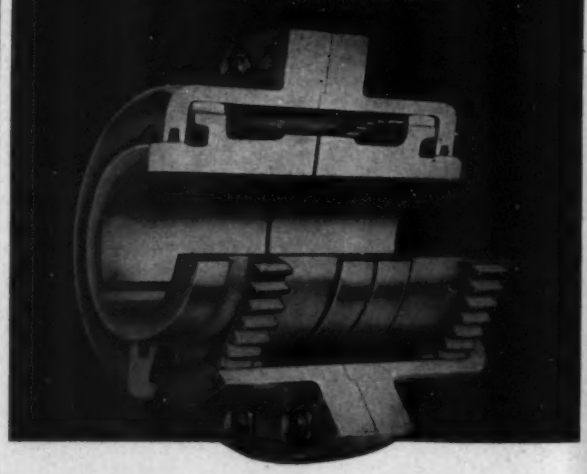
For data on this and other mill maintenance jobs, get this free, illustrated, 28-page manual. Crammed with tips on how to step up maintenance efficiency, conserve man-hours and cut costs. Write today.

OAKITE PRODUCTS, INC., 16 THAMES ST., NEW YORK, N. Y.

Technical Service Representatives Conveniently Located in All Principal Cities of the United States and Canada

OAKITE Buy Bonds for Victory **CLEANING**

POOLE



A COPY OF CATALOG GIVING FULL DESCRIPTION AND ENGINEERING DATA SENT UPON REQUEST.

FLEXIBLE COUPLINGS

POOLE FOUNDRY & MACHINE COMPANY WOODBERRY, BALTIMORE, MD.

"NON-USERS ARE THE LOSERS"

PROFIT PRODUCERS

TENAX FELTS

For The "Duration"

That word "duration" has come into frequent use during wartime. It really is an old word with TENAX FELTS. They always enlist for a long tour of duty. They stand up steadfastly to their long lasting job of producing perfect paper and board,—at high speeds. Try TENAX FELTS now!

"Non-Users Are The Losers"

LOCKPORT FELT COMPANY

NEWFANE, N. Y.—U.S.A.

plans of rotation wherein all employees are treated alike, for they share equally in desirable and undesirable work shifts. More than 150,000 of these are being distributed free of charge by the company as its contribution to America's war effort.

Association Reports

All of the orders which affect the industry emanate from the OPA and WPB and clear through the office of E. W. Tinker, executive secretary of the American Paper and Pulp Association. Copies of all government orders are sent by the Association to members. Listed below are releases sent out during March by the APPA. Any correspondence with that office regarding these releases should carry identifying titles and numbers as listed.

Federal Regulations

General No. 2—Limitation. Allocation and Procurement Orders—The American Paper and Pulp Association has prepared two charts showing the more important Procurement, Limitation, and Allocation orders issued by various Government agencies, which directly affect the paper and pulp mills. These charts show at a glance the inter-relationship of these various orders.

Paper Production No. 11 — M-241 — Amended — Order M-241, amended three times, is available, with all three amendments included and brought up-to-date.

Legislation and Public Affairs

General No. 9—Pending Patent Applications Vested in the Alien Property Custodian.

Traffic No. 5—Paper and Pulp Industry Freight Carloadings Survey—The Traffic Committee has just completed a significant survey of a representative cross-section of the industry to determine the approximate increase in carloadings of various papers, pulp board, and wood pulp.

Books

The Book: The Story of Printing and Bookmaking—This book colorfully portrays the story of how books came into being and of those earliest books—books which were written and illustrated by hand. It tells of the invention of printing and of how that invention made it possible for books to be produced so cheaply and in such quantities that all men might have them. It tells further of the development of bookmaking into an art and of the ceaseless effort of craftsmen and artists to produce the book that shall be perfect.

The present edition is the third revised edition of this monumental work under the same name, the seventh edition as successor to four editions of *The Golden Book*, first published in 1927. Its author, Douglas C. McMurtrie, is a well-known book designer, typographer, and authority on the history of printing.

The book totals more than 675 pages of material including a very extensive bibliography and index. There also are more than 170 illustrations, many of which are reproductions of title pages, text pages, and engravings from famous books.

Set in linotype Granjon with Ludlow Garamond and Delphian for display, the book is printed on special laid paper watermarked with the author's monogram, and bound in Bancroft's buckram.

Because of the closeness of paper to printing, it is believed that this book, authoritative, interesting, and attractive should be read with satisfaction and profit by many pulp and paper mill readers.

Priced at $5 a volume, the publisher is Oxford University Press, 114 Fifth Ave., New York, N. Y.

Cellulose Chemistry—Mark Plunglan, Ph. D., Chemist, Homasote Company, is the author of this small volume. Designed as an introduction to the chemistry of cellulose, the book treats of the following subjects: Cellulose and Associated Substances, Microstructure of Cotton and Wood Fibers, Isolation and Purification of Cellulose, General Properties of Cellulose, Dispersion of Cellulose, Derivatives of Cellulose, Modified Cellulose, Constitution of Cellulose, and Micellar Structure of Cellulose. It is a work of approximately 100 pages, bound durably and attractively in a stiff cloth cover. Published by Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y., the book is priced at $2.25 a copy.

Public Library Service to Business—This book is based on a questionnaire survey submitted to libraries of widely varying sizes and widely distributed throughout the United States. The survey was undertaken because of the increase in number of business libraries in recent years, and because of the increase in work done by existing libraries. The data accumulated from the survey and incorporated in the book provide an account of practices followed by the libraries in selecting and maintaining business collections; an analysis of the use and relation of cost to use in connection with investment services, city directories, business directories, books and magazines; a discussion of the relationship between business book and magazine publishers, directory publishers, government bureaus and librarians in the production of these publications; and a record of the city directories, trade directories, investment services, war services, business books and magazines in cities over 70,000. Written by Marian C. Manley, Branch Librarian of the Newark (N. J.) Business Branch of the Public Library and published by The Public Library, Newark, N. J., the book is priced at $3.50 a copy.

CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS — *per cwt.*

OPA ceiling prices in sales to consuming mills delivered buyer's usual receiving point, with brokers' allowance not in excess of 5 per cent.

Blue Overalls	–5.50
Corduroy, Men's	–3.50
Cottons—	
Washables, No. 1	–3.00
Percales	–4.75
New Soft Blacks	–3.75
Khaki Cuttings—	
Bleachable	–4.25
Unbleachable	–3.50
New White Canvas	–6.50
New Mixed Blacks	–3.25
Shirt Cuttings—	
New White No. 1	–7.25
No. 1 White Headings	–7.25
White Shrunk	–5.00
Silesias No. 1	–5.75
New Unbleached	–7.50
Fancy	–3.50
Linen Cuttings—	
White	–14.00
Grey	–14.00

RAGS (Domestic)

f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowances of $1 to $2 a ton depending on the value of the grade involved.

Roofing—	*per ton*
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	36.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
Whites, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)

ex dock New York City

NEW RAGS — *per cwt.*

New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS — *per cwt.*

No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shopperies	

ROPE and BAGGING

f. o. b. and ex dock New York City

Gunny No. 1—	*per cwt.*
Foreign	Nominal
Domestic	4.40 to 4.60
Wool Tares—	4.00 to 4.25
Light	4.25 to 4.50
Heavy	
No. 1 Scrap Bagging	3.75 to 4.00
Manila Rope—	
No. 1 large	–*115.00
No. 1 small	–*105.00
Sisal Rope—	
No. 1 large	–*95.00
No. 1 small	–*85.00
New Burlap Cuttings	5.75 to 6.25
Jute Threads—	
Foreign (Nom.)	6.25 to 6.75
Domestic	5.50 to 6.00
Strings—	
No. 1 sisal	–*80.00
No. 2 sisal	–*60.00
Soft Jute	4.75 to 5.00
Mixed	1.35 to 1.50

*OPA ceiling price per ton f. o. b. shipping point.

WASTE PAPER

OPA ceiling prices f. o. b. points of shipment, with brokers' allowance of 4 to 9 per cent.

Shavings—	*per ton*
White Env. Cuts, One-Cut	67.50–
Hard White Env. Cuts	62.50–
Hard White, Unruled	57.50–
Soft White, One-Cut	57.50–
Soft White, Misc.	43.00–
Fly Leaf, No. 1	33.50–
Fly Leaf, Woody, No. 1	25.00–
No. 2 Mixed Col. Woody	18.00–
Flat Stock—	
No. 1 Heavy Magazines	33.50–
Mixed Books	17.00–
Ledger Stock—	
No. 1 White	43.50–
No. 1 Mixed (Colored)	37.50–
Manilas—	
New Env. Cuttings	53.00–
New Env. Cuts, One-Cut	57.50–
Extra Manilas	37.00–
Manila Tab Cards, Free of Ground Wood	45.00–
Ground Wood Manila Tab Cards	27.00–
Kraft—	
Envelope Cuttings	65.00–
Mixed Env. or Bag Cuts	55.00–
Tripled Sorted No. 1 Brown	50.00–
New 100% Cor. Cuts	45.00–
No. 1 Old Assorted	35.00–
News—	
White Blank	33.00–
Oversissue	17.00–
No. 1 Baled	15.00–
Old Kraft Corrugated Containers	30.00–
Old Corrugated Boxes	16.50–
New Corrugated Cuts	18.00–
Mill Wrappers	17.00–
Box Board Chips	14.50–
No. 1 Mixed Paper	14.00–

CHEMICALS

f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25–
Ground, cwt.	4.00–
Powdered, cwt.	4.40–
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	60.00 to –
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	19.00 to 20.00
80-100 mesh (bags), lb.	19.50 to 20.50
Argentine, lb.	—
China Clay—	
Domestic Filler Bulk (mine) ton	7.50 to 15.00
Domestic Coating Bulk (mine) ton	12.00 to 22.00
Imported (ship side) Bulk (lump) ton	15.00 to 26.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glyc. (C.P.) drums, lb.	18.25 to 18.75
Litharge, powd., bbl., lb.	.09 to –
Rosin (Gum)—	
New York, per 100 lbs.	
E	3.77–
F	4.03–
G	4.07–
WW	5.55–
Rosin (Wood), carlots	3.05–
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	20.00 to
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30 –
Ground and flake, drums, cwt.	2.70 –
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works) cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.10–
Pearl, barrels, cwt.	3.20–
Paper (Sp.) bags, cwt.	3.20–
barrels, cwt.	3.30–
Sulphur (cruda)—	
(mine) bulk, long ton	16.00 to 20.50
Talc—	
Dom. 100 lb. bags (mine) ton	16.00 to 21.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	.06¼ to .06½

WOOD PULP

OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo.:

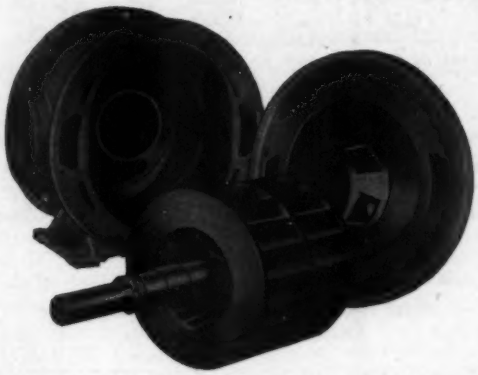
Bleached softwood sulphite	76.00
Unbleached softwood sulphite	66.00
Bleached hardwood sulphite	73.50
Unbleached hardwood sulphite	63.50
Bleached Mitscherlich sulphite	81.00
Unbleached Mitscherlich sulphite	72.00
Northern bleached sulphate	86.00
Southern bleached sulphate	79.00
Northern semi-bleached sulphate	82.00
Southern semi-bleached sulphate	75.00
Standard news print siderurus	46.00
Northern unbleached sulphate	73.00
Southern unbleached sulphate	63.50
Bleached soda pulp	66.00
Unbleached soda pulp	62.00
Ground wood pulp	46.00
Sulphite screenings	38.50
Sulphate screenings	38.00
Ground wood screenings	30.00
Northern unbleached sulphate siderurus	73.00
Southern unbleached sulphate siderurus	63.50

PAPER

f. o. b. New York City

Boards—	*per ton*
Binders	84.00–
Chip	45.00–
Chip, agl. mis. lined	60.00–
Coated, white patent .016	80.00–
.020 and heavier	75.00–
Kraft liner	60.00–
News	48.00–
Book (easel)	*per cwt.*
No. 1 Coated	15.50–
No. 2 Coated	14.00–
No. 3 Coated	13.25–
No. 4 Coated	12.75–
No. 2 Offset	11.00–
A Grade Super	10.75–
B Grade Super	10.25–
Bonds (Rag Content)—	
100% Rag	*per cwt.*
Ext. No. 1	42.50 to 46.00
100% Rag	35.00 to 37.75
85% Rag	
75% Rag	25.00 to 27.00
65% Rag	
50% Rag	20.80 to 22.75
25% Rag	18.20 to 20.00
Regular Colors	1.00 cwt. extra
Bonds (Sulphite)—	*per cwt.*
No. 1	11.70–
No. 2	10.75–
No. 4	9.90–
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	*per cwt.*
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleach. (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleach. (25 lb. up)	11.00 to 11.50
Unbleach. (25 lb. up)	10.00 to 10.50
Ledgers (Rag Content)—	
100% Rag	*per cwt.*
Ext. No. 1	41.40 to 43.50
100% Rag	36.25 to 39.25
85% Rag	32.20 to 37.75
75% Rag	26.25 to 28.00
65% Rag	22.80 to 27.75
50% Rag	22.10 to 24.25
25% Rag	19.50 to 21.50
Regular Colors	1.00 cwt. extra
Ledgers (Sulphite)—	*per cwt.*
No. 1	13.00–
No. 2	12.05–
No. 4	11.20–
News—	*per ton*
Rolls (Contract)	54.00–
Rolls (Spot)	(nominal)
Sheets	62.00–
Tissues (Carlots)—	*per ream*
White, No. 1	1.10 to 1.20
White, No. 2	1.00–
Bleached Anti-Tarnish	1.15–
Colored	—
Anti-Tarnish Kraft	.70–
Manila	.90 to .95
Napkins, semi-crepe (12½ lb. to M shts.) per ea.	.60–
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per ea.	.80–
Toilet, Bleached (M shts.) per ea.	5.65–
Toilet, Unbleached (M shts.) per ea.	4.25–
Towels—	*per case*
Bleached	3.20 to 3.75
Unbleached	2.60 to 3.05
Wrappings (Kraft)—	*per cwt.*
Extra Quality	5.75–
Super-Standard	5.00–
No. 1 Wrapping	4.75–
Standard Bag	4.12½–
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)	
Bleached papers—	
M.F. & M.G. Waxing, 20 lb. (Carloads only)	*per cwt.* 7.25 to 7.50
(10,000 lbs.)	7.50 to 7.75
Drug wrapp. 35 lb.	7.00 to 7.25
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	5.50 to 5.75
No. 1 Butchers	5.75 to 6.00
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	6.25 to 6.50
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	6.00 to 6.25
Steam Finish, 50 lb.	5.00 to 5.25
Water Finish, 40 lb.	5.50 to 5.75
Manilas—	
Envp. Mls., Sub. 16-40 (No. 1)	6.00 to 6.25
Envp. Mls., Sub. 16-28 (No. 2)	5.75 to 6.00
Envp. Mls. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mls. 35 lb. up—	
No. 1	6.00 to 6.25
No. 2	5.75 to 6.00
M. G. Sulphite and Kraft (other than Waxing)	
Grade A-22 lb.	7.20 to 7.40
Grade B-20 lb.	6.75 to 7.00

SIMPLICITY



NASH VACUUM PUMPS HAVE ONE MOVING PART

Operating advantages made possible by the Nash principle, and present in no other type of vacuum pump, permit a new level of operating economy. Nash Vacuum Pumps have but one moving part, a rotor cast in one piece, and revolving without metallic contact. There are no valves, no pistons or sliding vanes, no internal parts requiring wear adjustment or lubrication.

NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.

PULP & PAPER MILL
Screens

Precision perforations in all sizes for large production and screen durability

Copper * Steel
Monel * Stainless Steel
Chemical Resisting Alloys

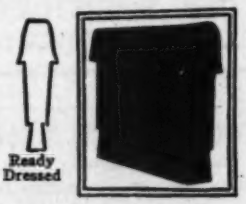
The Harrington & King PERFORATING Co.

5654 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N. Y.

"READY DRESSED" MILL COGS

LABOR SAVING—TIME SAVING

The Most Economical Filling That Can Be Put in a Mortise Wheel.



Ready Dressed

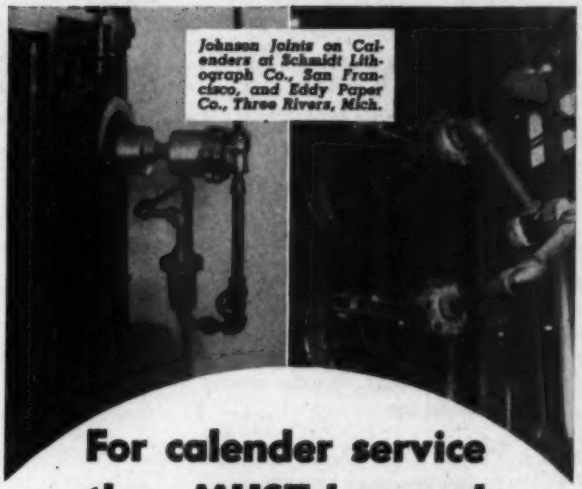
Blank Head

We Make Any Style or Size Wanted.

Write for Instruction Sheet "O" Which is Free.

QUICK SERVICE ON ALL SIZES

THE N. P. BOWSHER CO., South Bend, Ind.



Johnson Joints on Calenders at Schmidt Lithograph Co., San Francisco, and Eddy Paper Co., Three Rivers, Mich.

For calender service they MUST be good

IT takes the tough jobs to show how completely Johnson Joints have outmoded the old stuffing box type of steam fits.

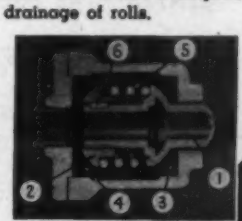
Their outstanding record on calender service is a good example. With the old style stuffing boxes, the lateral shifting of heavy calender rolls causes life-shortening wear of packing and parts—calls for frequent repacking and replacement. But with the Johnson Joint this lateral misalignment is *absorbed*, without any loss of operating efficiency. An annular space between the nipple and the housing allows the roll to shift in any direction—without impairing the seal—without causing any uneven wear.

This self-aligning feature is only one of the many reasons why more than a hundred paper mills have purchased 50 or more Johnson Joints—why more than fifty mills have purchased from 100 to as many as 800. Its packless, self-oiling, self-adjusting design ends *all* steam fit troubles—cuts maintenance cost—saves valuable production time—offers a simpler, neater way to provide for syphon drainage of rolls.

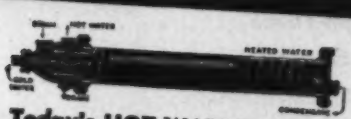
For Calenders, Paper Machines and Corrugators

Nipple (1), fastened to roll. Sliding collar (2), keyed (6) to nipple. Carbon graphite seal ring (3) and bearing ring (4), which eliminate packing and oiling. Spring (5) is for initial seating only; in operation joint is pressure sealed.

Write for new bulletin



JOHNSON *Rotary Pressure* JOINTS



Today's HOT WATER Answer

The simplest, quickest, most economical way to heat water with steam is with the Johnson "Instant" Water Heater. Hook it right up to your high pressure steam line—needs no reducers. Simple, rugged design assures long life. Available *right now* in new all steel, lower cost construction, in complete range of sizes and capacities.

Write for Bulletin

The Johnson Corporation

845 WOOD STREET THREE RIVERS, MICH.

IMPROVED PAPER MACHINERY CORPORATION

NASHUA, NEW HAMPSHIRE

CONTINUOUS ROTARY VACUUM FILTERS, including:

Black Liquor (Brown Stock) Counter-Current Washers

Bleached Stock Washers

Sheet Forming Machines

Sludge Filters

Save-alls

Special Purpose Filters

FLAT SCREENS—IMPCO Low Type with Dunbar (Patented) Drive

OPEN CYLINDER MACHINES, including:

Deckers (Single or Double End)

Multiple Stage Washers (2, 3, 4 or 5 Stage)

KNOTTERS

CENTRIFUGAL PULP SCREENS

BLEACHING EQUIPMENT (THORNE)

PNEUMATIC MACHINES (Raw Water Filters, Thickeners, or Save-alls)

TRAVELLING SHOWERS (With Hydraulically Operated Oscillating Nozzles)

OPEN CYLINDER MOULDS (Brass, Bronze, Iron, or Stainless Steel)

LABORATORY OR PILOT PLANT EQUIPMENT, including:

Midget Filters

Flat Screens

Deckers

SPECIAL MACHINERY

Also auxiliary equipment including Shredders, Re-pulpers, Mixers, Stock Volume-Metering Devices, Bellmer Agitators, etc.

Write for additional information and IMPCO services.

The Cram . . .

Low Consistency and Volume Regulator
(For Pulp Screening Systems)
Dryer Drainage System Syphon Installator, etc.

The Cram Company, Inc.
Appleton, Wisconsin

J. W. HEWITT MACHINE CO., Inc.

NEENAH, WISCONSIN

Builders of
Paper Making Rolls and Special Machinery
Roll Grinding a Specialty

WANTED—Machineries for making straw board, 20 tons in 22 hours. Apply Modi Sugar Mills Ltd., Begamabad (U.P.) India.

WANTED—Experienced machine tenders and back tenders for Yankee Fourdrinier machines in an Eastern mill. Reply stating experience, age and draft status. Address Box 330, Fritz Publications, Inc.

PAPER MANUFACTURERS—Are you getting 3 tons of paper off each square foot of wire? Do your dryer felts cost over 30c per ton? Address Applied Science, Box 43, Three Rivers, P. Q., Canada.

★ ★ ★ Sell your Typewriter to Uncle Sam. Call the nearest Underwood Elliott Fisher Branch Office for details. ★ ★ ★ ★ ★

JEWELL BELT HOOK

The best for leather, rubber and cotton belting.
Potter's Patent—Every Hook Guaranteed
Manufactured and Sold by
JEWELL BELT HOOK CO.
Naugatuck, Conn.
Illustration shows teeth being hammered down and clinched.

PULP BLEACHING COMPANY

WAUSAU, WISCONSIN

EQUIPMENT FOR CELLULOSE PURIFICATION AND RELATED PROCESSES

GEORGE F. HARDY

Consulting Engineer
305-309 Broadway, New York City, N. Y.
Member—Am. Soc. C. E.—Am. Soc. M. E.—Eng. Inst. Can.
Consultation—Reports—Valuations—Estimates—Paper and Pulp Mills—Hydro-Electric and Steam Power Plants—Plans and Specifications

INDEX TO ADVERTISERS

When writing them, please mention The Paper Industry and Paper World

Allis Company, The Louis.....65-66
American Chain & Cable Co. 91
American Cyanamid & Chemical Corp.
American Manganese Steel Div. 81
Appleton Machine Co., The.....
Appleton Wire Works, Inc. 80
Appleton Woolen Mills..... 95
Armstrong Machine Works.....
Asten-Hill Mfg. Co. 97
Atkins and Company, E. C. .....
Aurand Mfg. & Equipment Co. 95
Automatic Transportation Co. 23
Bagley & Sewall Co. 2
Bakelite Corporation .....
Baker-Raulang Co., The..... 73
Bauer Bros. Co., The..... 99
Beloit Iron Works..... 1
Betz, W. H. & L. D. 51
Binney & Smith Co. 95
Bird Machine Company.....
Black-Clawson Co., The..... 31
Boston Woven Hose & Rubber Co. ... 63
Bowser & Co., Inc., S. F. 89
Bowsher Co., The N. P. 103
Buffalo Pumps, Inc. 57
Calco Chemical Div., American Cyanamid Company 19
Cambridge Instrument Co., Inc. 52
Cameron Machine Co. 72
Carthage Machine Co. .....
Cash Company, A. W. .....
Chain Belt Company..... 83
Chemipulp Process, Inc. 91
Chicago Electric Company..... 70
Chromium Corp. of America.....
Clark Tructractor Div., Clark Equipment Company 76
Classified Advertising 104
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. .....
Columbian Carbon Co. 95
Cooper Alloy Foundry Co., The..... 20
Corn Products Sales Co. .....
Corning Glass Works.....
Covel-Hanchett Company..... 68
Cram Co., Inc., The..... 104
Darnell Corporation, Ltd. 94
De Laval Steam Turbine Co. 32
Dilts Machine Works..... 31
Dow Chemical Co., The..... 49
Downingtown Mfg. Co. .....4th Cover
Draper Brothers Company..... 61
du Pont de Nemours & Co., E. I. 26
Duriron Co., Inc., The.....
Eastwood-Nealley Corporation.....
Fairbanks Company, The..... 89
Ferguson & Co., Hardy S. 98
Fitchburg Screen Plate Co., Inc. .....
Flexible Steel Lacing Co. .....
Foxboro Company, The.....
Frederick Iron & Steel Co. .....
Fritz Publications, Inc. 91, 106
Garlock Packing Co., The.....
Gates Rubber Company..... 53
General Coal Co. .....
Glyco Products Company..... 95
Goulds Pumps, Inc. 93
Graton & Knight Company.....14-15
Graver Tank & Mfg. Co., Inc. 22
Greene, Tweed & Company..... 74
Gruendler Crusher & Pulverizer Co. .. 88
Hardy, George F. 104
Harrington & King Perforating Co. ... 103
Harris-Seybold-Potter Co. .....2nd Cover
Hermann Manufacturing Co., The.....
Hewitt Machine Co., J. W. 104
Hills-McCanna Company 84
Hunt Machine Co., Rodney..... 92
Huyck & Sons, F. C. 8
Improved Paper Mach'y Corp. 104
International Nickel Co., Inc. 30
International Wire Works..... 88
James Mfg. Co., D. O. .....
Jeffrey Manufacturing Co., The.....
Jewell Belt Hook Company..... 104
Johnson Corporation, The..... 103
Johnstone Engrg. & Mach. Co. 89
Jones & Sons Company, E. D. 90
Jones Foundry & Machine Co., W. A.
Kalamazoo Tank & Silo Co. 87
Kalamazoo Vegetable Parchment Co...
Koppers Company .....
Langston Co., Samuel M. .....3rd Cover
Lawrence Machine & Pump Corp. 86
Layne & Bowler, Inc. 82
Lewellen Manufacturing Co. .....
Lindsay Wire Weaving Co., The..... 93
Link-Belt Company .....
Lockport Felt Company..... 101
Lunkenheimer Co., The..... 59
Mason-Neilan Regulator Co. .....
Mathieson Alkali Works, Inc. 4
Menasha Products Co., The.....
Mercury Manufacturing Company....
Michigan Steel Casting Co. 90
Mixing Equipment Co., Inc. .....
Monsanto Chemical Company..... 71
Morey Paper Mill Supply Co. .....
Morris Machine Works..... 77
Mt. Vernon-Woodberry Mills, Inc. ....
Murray Mfg. Co., D. J. 98
Nash Engineering Co., The..... 103
National Safety Council, Inc. 96
Naylor Pipe Company.....
Nichols Engrg. & Research Corp. .....
Norma-Hoffmann Bearings Corp. 87
Norton Company .....
Norwood Engineering Co., The..... 75
Oakite Products, Inc. 100
Ohio Injector Co., The..... 6
Oliver United Filters, Inc. .....
Orr Felt & Blanket Co., The.....
Paper & Industrial Appliances, Inc. ..
Paper Makers Chemical Dept. of Hercules Powder Company.....
Patterson Foundry & Mach. Co...1st Cover
Perkins & Son, Inc., B. F. 85
Philadelphia Quartz Co. 87
Pittsburgh Piping & Equipment Co. 17
Poole Foundry & Machine Co. 100
Powell Company, The Wm. 69
Pulp Bleaching Company..... 104
Pusey & Jones Corp., The..... 13
Reliance Electric & Engrg. Co. 7
Research Corporation .....
Rockwood Manufacturing Co. .....
Rogers & Co., Samuel C. .....
Rollway Bearing Co., Inc. 79
Ross Engineering Corp., J. O. .....
Ryerson & Son, Inc., Joseph T. 97
Sandusky Foundry & Machine Co. ....
Scientific Lubricants Co. 89
Shartle Bros. Machine Co. 31
Shuler & Benninghoven..... 24
Simonds Saw and Steel Co. .....
Simonds Worden White Co. .....
Smith & Winchester Mfg. Co. 84
Solvay Sales Corporation.....
Standard Oil Co. (Indiana)..... 25
Stebbins Engrg. & Mfg. Co. .....
Stein, Hall & Company, Inc. .....
Stickle Steam Specialties Co. .....
Texas Company, The 3
Timken Roller Bearing Co., The..... 47
Titanium Pigment Corporation..... 21
Towmotor Corporation 67
Treasury Dept., U. S. A. .....
Trimbey Machine Works..... 76
Turner Halsey Company.....
Underwood Elliott Fisher Co. 104
United States Rubber Company..... 9
Valley Iron Works Company.....
Vanderbilt Co., Inc., R. T. .....
Waldron Corporation, John.....
Warren Steam Pump Co., Inc. 54
Waterbury & Sons Co., H. 89
Waterbury Felt Co., The..... 90
Weyerhaeuser Timber Co. .....
Williams and Co., C. K. 98
Williams-Gray Company .....
Worthington Pump & Machinery Corp.
Wright Manufacturing Div. of American Chain & Cable Co. 91
Wyandotte Chemicals Corporation... 29

Refer to the PAPER and PULP MILL CATALOGUE, at your mill office, for complete listing of all advertisers' products.

now

. . . the 1942 edition of the PAPER AND PULP MILL CATALOGUE and Engineering Handbook is available at your mill office.

A bigger and better catalogue section awaits your inspection. Prominent manufacturers of pulp and paper mill equipment and supplies present descriptive and other important information about their products.

A complete, cross-indexed buyers service lists sources of purchase of machinery, equipment, chemicals and supplies.

The Engineering Handbook has again been increased to be of added service. It contains numerous pertinent tables, charts and other authoritative data relative to the operation and maintenance of pulp and paper mills.

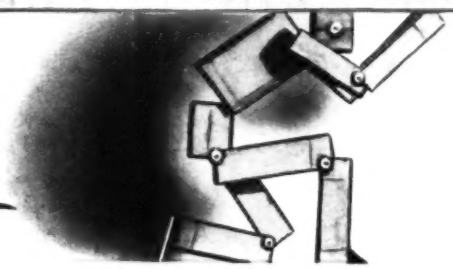
These firms describe their products in the 1942 edition—

Acme Steel Company
Allegheny Ludlum Steel Corporation
Allington & Curtis Manufacturing Co.
American Cyanamid & Chemical Corp.
American Defibrator, Inc.
American Paper Mach'y and Engineering Works, Inc.
Appleton Machine Company, The
Atkins and Company, E. C.
Bagley and Sewall Company, The
Bauer Brothers Company, The
Belait Iron Works
Biggs Boiler Works Company, The
Bird Machine Company
Black-Clawson Company, The
Blaw-Knox Co. (Power Piping Div.)
Blaw-Knox Division (Blaw-Knox Co.)
Brush Div., Pittsburgh Plate Glass Co.
Buffalo Forge Company
Buffalo Foundry & Machine Company
Buffalo Pumps, Inc.
Cameron Machine Company
Carthage Machine Company
Cash Company, A. W.
Chemical Lining Engineers, Inc.
Chemipulp Process, Inc.
Chicago Electric Company
Clark-Aiken Company, The
Control Equipment Corporation
Covel-Hanchett Company
Dilts Machine Works
Downingtown Manufacturing Company
English China Clays Sales Corporation
Falk Corporation, The
Fawick Airflex Co.
Garlock Packing Company, The
Glens Falls Machine Works, Inc.
Golden-Anderson Valve Specialty Co.
Goslin-Birmingham Manufacturing Co.
Graver Tank & Manufacturing Co.
Gruendler Crusher & Pulverizer Co.
Harris-Seybold-Potter Company
Hauser-Stander Tank Company, The
Hercules Powder Company, Inc.
Hermann Manufacturing Company, The
Hewitt Machine Company, Inc., J. W.
Hills-McCanna Company
Holyoke Machine Company
Improved Paper Machinery Corporation
James Manufacturing Company, D. O.
Jeffrey Manufacturing Company, The
Johns-Manville
Johnson Corporation, The
Jones & Sons Company, E. D.
Jones Foundry & Machine Co., W. A.
Kalamazoo Tank & Silo Company
Langston Company, Samuel M.
Lawrence Machine & Pump Corporation
Leader Iron Works, Inc.
Link-Belt Company
Lovejoy Flexible Coupling Company
Mason-Neilan Regulator Company
Maxson Automatic Machinery Company
Meisel Press Manufacturing Company
Merrick Scale Manufacturing Company
Michigan Pipe Company
Monsanto Chemical Company
Morris Machine Works
Moyno Pump Div., Robbins & Myers, Inc.
Murray Manufacturing Company, D. J.
National Aluminate Corporation
Naylor Pipe Company
Nicholas Engineering & Research Corp.
Norma-Hoffmann Bearings Corporation
Norwood Engineering Company, The
Ohio Grease Company, The
Paper and Industrial Appliances, Inc.
Paper Makers Chemical Department (Hercules Powder Co.)
Pennsylvania Salt Manufacturing Co.
Pittsburgh Plate Glass Company (Brush Div.)
Power Piping Division (Blaw-Knox Co.)
Pomona Pump Company
Record Foundry & Machine Company
Robbins & Myers, Inc.
Rogers & Company, Samuel C.
Rollway Bearing Company, Inc.
Ross Engineering Corporation, J. O.
Sandy Hill Iron & Brass Works, The
Schutte & Koerting Company
Seybold Division, Harris-Seybold-Potter Company
Shartle Brothers Machine Company
Simpson Company, The Orville
Sinclair Company, The
Solvay Sales Corporation
Spray Engineering Company
Stebbins Engineering & Mfg. Co.
Swenson Evaporator Company
Taylor Forge & Pipe Works
Textile-Finishing Machinery Company
Toledo Scale Company
Trimbey Machine Works
Twin Disc Clutch Company
Union Machine Company
Union Screen Plate Company
Valley Iron Works Company
Waldron Corporation, John
Wallace & Tiernan Company, Inc.
Westinghouse Electric & Mfg. Co.
Westco Pump Div., Pomona Pump Company
Whiting Corporation
Wyckoff & Son Company, A.

FRITZ PUBLICATIONS, INC.
59 EAST VAN BUREN STREET, CHICAGO, ILL.

Please mention the PAPER AND PULP MILL CATALOGUE when making inquiries.

PAPERBOARD CARRIES A WAR-PACK TOO!

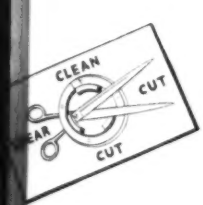


The

Paperboard Industry increasingly has labored to keep up with war demands while also supplying the civilian front. In this effort, no small part is played by the machines whose built-in stamina now shows its worth in keeping up production 24 hours a day.

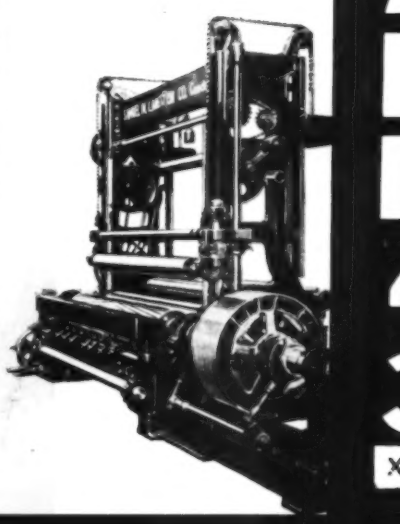
Langston always has prided itself on putting into every machine bearing its name, a bit more careful design, a more rigid standard of quality for materials used, the highest measure of workmanship. All this has resulted in Langston users getting that extra something so vital now when men and machines alike are called upon for *more* than their supposed limit of endurance.

SAMUEL M. LANGSTON COMPANY, Camden, N. J.

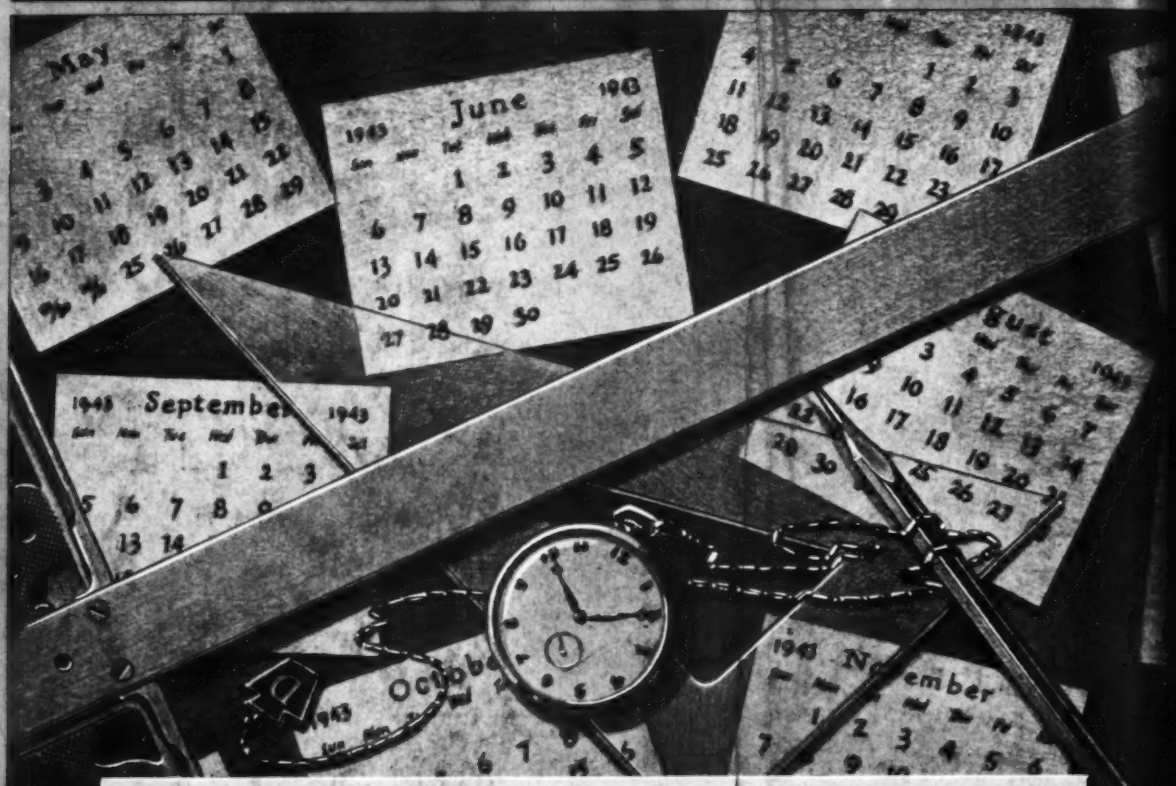


LANGSTON

SLITTERS AND ROLL WINDERS



DOWNINGTOWN



NOW IS THE TIME FOR PLANNING YOUR POST-WAR NEEDS

When the Germans say "Kamerad!" . . . the Italians "Sorrendere!" . . . and the Japs "Kōsan!" . . . from then on, there won't be enough hours in a day for our engineers. . . . Mills have not been permitted to take the usual "Stitch in Time (which) Saves Nine" because of the war-time ban on normal replacements. But after Victory is Won . . . all at once, mills will want an exceptional amount of new equipment to rejuvenate and replace war-worn machinery. . . . Our Engineering Staff can now give your post-war needs, the time and thought which you may be "too much in a hurry" to allow, after the Armistice is Declared. Now, you could open-mindedly consider drastically new equipment designs or machine arrangements which you might later thoughtlessly (and unprofitably) veto in haste. . . . Plans made now can easily be revised later, thus your machinery will arrive months ahead of those who fail to PLAN NOW. . . . Downingtown Manufacturing Co., Downingtown, Pennsylvania.

PLAN NOW • GET A PRIORITY RATING OF D AAA ON POST-WAR DELIVERY